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*THE RESOURCES OF MONTANA AND THEIR DEVELOPMENT.**

IN casting about for a theme for discussion at the opening of this the second meeting of the Montana Academy of Sciences, Arts and Letters, it seemed appropriate to follow some of the ideas suggested in my preceding address, and elaborate more fully the ideas advanced. This is all the more necessary since the work of the academy is yet in a formative period, and the members to a large extent have no means of communication save by mail. They have to a large extent not grasped the idea of the necessity of individual effort to do something definite in original work. This is not surprising from the fact that one easily loses enthusiasm and interest in the absence of kindred spirits with whom to talk matters over and thus keep alight the spark of interest.

The state of Montana, the state of grand mountains, whose snow-clad summits pierce the clouds, and whose hidden treasures are of untold richness; the state of blue sky, clear sunshine, pure air and crystal water; the state rich in mineral wealth, rich in timber resources, and with great possibilities for agriculture; the state with beautiful lakes, foaming rivers whose waters teem with the finny tribe, and with broad and fertile valleys rapidly filling with happy and prosperous people; the state in which are raised the finest and fleetest horses of the world; the state with its five millions

* Address delivered at the second annual meeting of the Montana Academy of Sciences, Arts and Letters, at Anaconda, Mont., December 29–31, 1903.

of sheep, its three quarters of a million of cattle, its one fifth of a million of horses; the state whose annual production of gold is five millions of dollars, of silver twenty millions, lead sixteen millions of pounds, copper a quarter of a billion of pounds, two million tons of coal, a half million dollars in stone, a half million dollars in brick and clay products; the state with its two millions of fruit trees, already producing a quarter of a million boxes of apples, its one and a quarter million tons of hay and nearly ten million bushels of grain; the state with its three thousand miles of railroads, its 42,000 square miles of forests, with a saw-mill product of nearly two millions of dollars annually; and yet the state is in its infancy. Its resources are barely known, and many are practically untouched.

The state has within its borders approximately ninety-four million acres of land. Of this amount twenty-six millions of acres are classed as mountain lands, thirty millions as farming lands, and thirty-eight millions as grazing lands. This is approximately 40,000 square miles of mountains, 50,000 square miles of farming lands and 56,000 square miles of grazing country. To put it in another way, the mountain area of the state is about equal to the entire area of either Indiana, Kentucky, Virginia, Ohio or Tennessee. Its grazing land is more than the total area of either Pennsylvania, Louisiana, Mississippi, New York or North Carolina. Its farming land is as much as in the entire state of Wisconsin, Iowa, Illinois, Michigan or Georgia.

We have a state with a mountain area of that of all Tennessee, a grazing area equal to all the area of Pennsylvania or New York, and farms left to cover the states of Illinois or Iowa. The mineral wealth of this state of mountains is as yet unknown, and new prospects open daily. The grazing possibilities are being greatly increased in the grazing section, and even much of the mountainous country has abundant and rich feed in summer. The agricultural region has yet to develop, but sufficient has already been done to predict a great future for the industry.

With a state equal in size to Indiana to supply gold, silver, copper and lead, as well as building stone and coal, another state equal in size to Pennsylvania to supply the beef, mutton, horses and goats for the mining population, and a state equal to that of Illinois to supply the grain, vegetables, fruits and hay, Montana is an empire in herself, capable of supplying all her wants. Clothing from wool, wealth from mines, grain and fruit from the fields and orchards, houses from the clay, rock or lumber, paper from the forests, coal from the hills, implements from the metals, gems from the mines, art in the peaceful valleys and rock-ribbed hills, fiction in Indian lore and trapper's tale of privation and suffering, poetry in nature, health in the air so pure and dry, sport in the hills or along the streams, all these make it possible for the citizens of this great empire to find at home, in their own state, all the essentials for modern civilized life, from the wants of nature to the esthetic realm.

Montana is a synonym for opportunity. This great state has less than two inhabitants per square mile. It presents to the man of health, energy and industry, an opportunity for successful business enterprise or professional advancement. Everywhere, on every side, there is opportunity. The great upheavals during the past geological ages have made mountain chains of great length and height, in whose depths man has already found untold wealth, and the hidden mineral yet unknown must be the heritage of the children of the future.

On the agricultural side what are the prospects for the future, based on the results of the experiments up to the present

time? The western part of the state is fast developing into a fruit region that will soon head off the great import of these products from Washington, Oregon and California. Of course the semi-tropical fruits will never be grown, but apples, pears, plums, small fruits and the like find here a climate suitable for growth. Nor is the region confined to the growth of fruits. Through irrigation great stretches of land grow waving grain, never failing the diligent farmer who but watches his fields.

On the eastern side the agricultural development has been beyond the most sanguine expectations. The valley of the Yellowstone has not only proved to be well adapted to fruit raising, but is now a great agricultural region. The climatic conditions are not as severe as were at first thought, and the outlook is as bright there as on the western side. The fame of the Gallatin valley is already widespread.

In the north is a large and unoccupied territory. Great stretches of tillable land await but the addition of water, which will make the country as rich and as prosperous as other sections of the state and country. The work of reclaiming the land is too great an undertaking for individual or corporate enterprise. But the beneficent effects of congressional legislation for the reclamation of arid lands through irrigation will soon be seen. In that northern section alone millions of inhabitants can find homes and occupations when the land is tilled. Abundant harvests will be gathered from the land, and cities will be found where now are trading posts and virgin soil.

During the past year it has been my pleasure to visit several parts of the state in connection with the work of the farmers' institutes. The gentlemen who have made up the companies of these institute instructors have given the closest attention to the possibilities of the regions of the state visited. Mr. W. B. Harlan, the veteran fruit grower of the Bitter Root valley, expresses the opinion that apples and small fruits can be grown successfully in the northern section of the state, although in the spring of 1903 there was not an orchard east of Chinook, and but one there. Professor F. B. Linfield, of the Agricultural College, believes that dry land farming, without irrigation, will in a few years be an important factor in the state's agricultural development. Professor Fisher, horticulturist in the Agricultural College at Bozeman, like Mr. Harlan, is also of the opinion that fruits may be grown where now it seems impossible to grow them.

What of the mines? The future for agriculture is no brighter than that for mining. 'New districts of magnitude and splendid values are constantly being developed,' says the State Commissioner of Agriculture. While the early history of the state is really the history of the development of some of its mines, mining now is not confined to a few sections of the state. In 1900 mining was carried on for gold and silver in the following counties: Beaverhead, Broadwater, Cascade, Chouteaou, Custer, Deer Lodge, Fergus, Flathead, Granite, Jefferson, Lewis and Clarke, Madison, Meagher, Missoula, Park, Ravalli and Silver-Bow. Lewis and Clarke was the greatest producer, with 70,000 fine ounces of gold and 172,531 fine ounces of silver. Custer County was the smallest producer, with 14.5 ounces of gold and 4 ounces of silver. The total product of gold and silver in the state in 1900 was 229,114.882 ounces of the former and 14,294,835.11 of the latter. In 1901 there were 232,331.454 ounces of gold and 14,180,545.19 ounces of silver. Since the discovery of gold in the state forty years ago more than one billion dollars in value of gold, silver, copper and lead have been

taken from the streams and mountains of the state. The industry is one of great importance to the state.

In 1901 copper was mined in the counties of Beaverhead, Granite, Jefferson, Lewis and Clarke, Madison, Meagher and Silver Bow, the last producing 227,742,262 pounds of the 228,031,503 pounds total. Lead was produced in all the counties mentioned except Madison, and in addition also in Broadwater, Cascade and Flathead. Broadwater and Meagher were about equal producers, with about two and one half million pounds each.

Coal statistics from an article by Professor J. Perry Rowe, of the University of Montana, which appeared recently in the *American Geologist*, show that Montana is undoubtedly one of the richest states in coal and lignite, although as yet these deposits have been but very little developed.

"All or most of the bituminous and semi-bituminous coals found in Montana come from the Cretaceous period and usually from the upper part, or the Laramie formation, and are found east of the main divide of the Rocky Mountains. The lignite is found both in the Cretaceous and later Neocene formations."

Professor Rowe says that it has been estimated that there are 13,000 or more square miles of Cretaceous bituminous and semi-bituminous coal area in Montana, and about 25,000 square miles of lignite area. "Not that all of this area is underlain by coal, but that the deposits are found quite abundantly throughout the territory." According to this estimate the coal area of the state is about one fourth of the entire area of the state. He says: "The bituminous area of Montana is greater than the combined bituminous areas of North Dakota, South Dakota, Wyoming, Washington, Oregon, Idaho and New Mexico. The lignite area is next to that of North Dakota, which has a larger lignite area than any of the northwest states." The tests show the Montana bituminous coal to be but little inferior to Pennsylvania bituminous coal. Professor Rowe reports that bituminous coal or lignite has been found in every county of the state except Jefferson County. The undeveloped coal industry will without doubt be a prominent factor in the expansion of other industries of the state.

Sapphire Fields.—Montana sapphires were first described in 1873 by J. Lawrence Smith, but actual mining began in 1891. One sapphire belt is twelve to eighteen miles east and northeast of Helena, and has been followed for about twelve miles, from Canyon Ferry down the river to American Bar. Sapphires have also been found at Rock Creek, Cottonwood Creek and Yogo Gulch. The Rock Creek region is about thirty miles west of Anaconda, the Cottonwood Creek field about ten miles east of Deer Lodge, and the Yogo mines in Fergus County, about thirteen miles west of Utica. The only systematic mining for sapphires in the United States is done in Montana. The annual output of sapphires in the state is something like 450,000 to 500,000 karats, including those suitable for cutting and those used for mechanical purposes. A lapidary at Helena has fifteen workmen cutting stones, and it is asserted that finer work is done here than on stones sent to be cut in London. "Altogether," says State Commissioner Ferguson, "the output of precious stones in Montana exceeds the production of all the rest of the United States, and forms a very interesting addition to our industries."

The Lumber Industry.—For the year ending June 30, 1902, 69 mills were running, with a total output of 210,047,000 feet of rough lumber. There were, in addition, from these mills, about five and a half million shingles and seventeen million

lath. The United States Geological Survey estimates the timber on the Lewis and Clarke forest reserve at 2,664,360,000 feet, board measure, and on all the reserves in the state 14,974,800,000 feet of merchantable lumber. It is estimated that there are 912,000,000 feet on state lands, bringing the total estimate of merchantable timber belonging to the state or government up to 15,886,800,000 feet. This does not include timber on the Northern Pacific Railroad land nor on the land belonging to the various mills. At the present rate of consumption the timber on the state and government lands would satisfy the mills for about seventy years. But the rate of consumption is increasing very rapidly.

An analysis of the industries which are lacking or very small shows the following: There are no zinc smelters in the state. The industry in iron and steel is not yet an integral part of the wealth of the state. Notwithstanding the timber and grain in the state there is not one pound of paper manufactured in the state. There are very few factories. The dairies are few and do not begin to supply the demand for butter. Montana produces 61 per cent. of the copper of the United States, but not a pound is converted into the finished product. Although Montana has more sheep than any other state in the union, it has but one woolen mill in the state.

If one wishes to make a study of the geology of the state or its natural history he has little to work on. Let the average student attempt to find out what is known relative to any section of the state, and he will have much difficulty. A portion of it has been covered by the work of the United States Geological Survey; much of it has not been studied. There is nothing obtainable save extracts from reports relative to the geology and natural history of the state. Teachers, students, private individuals alike must seek the libraries and cull from its numerous reports a small amount of information. Let me illustrate.

A student wishes to begin the study of the butterflies of the state and desires literature to aid him. What must he do? The eastern books cover the ground to the Great Plains. The insects from the Rocky Mountains are in great confusion. There is nothing to be placed in the hands of the student who wishes to work. He may secure Edwards's books with colored plates and full descriptions at $135. He may secure Holland's book with colored plates at $3. But without keys and full descriptions he can do little. Moreover, the material gathered from the state is very small, and collections are few. The student is beset at once with difficulties when he undertakes the work. His difficulties increase with continuance of study, and there is no help for him. The same is true of the study of fishes, birds, plants or mammals. There is nothing that the student who has not reached the plane where he can be called specialist may have for aid, unless he goes to the expense of books treating of the entire country. Even these will fail him often.

The study of the state's resources must be pursued with a twofold object in view: (1) To encourage immigration, (2) to enlighten the citizens of the state. We must all agree with Mr. Ferguson in his opening statement in his report as commissioner of agriculture, labor and industry for 1902, in which he says: "The magnitude and diversity of the natural history resources of this great state, the opportunities for the acquisition of comfortable homes and profitable investment are known to comparatively few people outside of its borders. It is clearly within the bounds of propriety for the people of any community to determine accurate knowledge of its advantages and invite immigration." We may as truthfully say that

it is clearly within the bounds of propriety for the people to determine for themselves what their natural advantages are, for their own enlightenment, for the education of the younger generation and for the development of the industries yet in infancy on a basis made from scientific study. I should make it more emphatic. It is not only within the bounds of propriety for the citizens of the state to do this, but it is their duty to promote the knowledge of their own material resources. We need people; there is no doubt of that. The state can easily support a population of several millions when its soil is under cultivation, when its orchards are bearing, when its new mines are opened up for full work and its other industries have developed. We need people, and we need them badly. We need capital also. This will come as soon as it is demonstrated that investment will be safe. But we are here, a quarter of a million of us. We are here, for the most part, to stay. The state's geological wealth and natural history wealth are the property of the people, and the people know little about it. It is not good business to be possessed of valuable property without making strenuous efforts to know something about the property.

Professor J. M. Hamilton said recently, in speaking to the students of the University of Montana, that the chief aim in our system of education should be to develop our resources and to know them, and that this will require the highest type of brain work. The resources are so varied that wide latitude may be had in the selection of work. The conditions are so varying that the greatest intelligence is necessary to carry on work which in other states requires little thought. The farmer must be an intelligent man and a student in order to handle water properly, so as to get the best results. The miner must be more than a laborer. He must know chemistry and physics. Every man must know more than is demanded of him by his daily work. He must have a big reserve.

The best men for developing the industries of the state will come from the youth of the state itself, if they are given the same facilities for carrying on their studies as are given their eastern competitors. These facilities are fast being supplied by the state institutions for higher education, which are now giving strong competition to the older and more widely known institutions. Add to this equipment the knowledge that may be had through daily contact with home conditions through the formative period of youth, and the young man will have the best equipment for his work that can be had.

The drift of my thought you have no doubt long since gathered. I am arguing for a geological and natural history survey by the state, for and by the people of the state and for outsiders if they wish to come into the state. We should have it. I believe we can have it, but we must work for it.

The history of the surveys of older states, and the reports printed, are ample proof of their utility. The value of a survey is beyond question. Granting that it should be established, the next step is to determine the breadth of the movement, the scope of the work, the policy to be pursued and the expense involved.

The survey should begin modestly, not attempting too much, developing plans slowly. Its board of directors should be entirely free from politics, and should include representatives from the various state institutions, and should include the governor of the state as chairman or president of the board. The bill recently drafted for the Wisconsin survey is a good model for use. All the institutions interested and all the scientific bodies should be made to feel that they are to have a

part in the work, for to get the best results will require the best effort of the best heads in the state. A governing board consisting of the governor, the president of the university, the president of the school of mines, the president of the agricultural college or the director of the experiment station, the president of the academy of sciences, arts and letters, with perhaps the president of the state board of horticulture and the president of the society of engineers, would certainly be above criticism, and would adopt a broad and liberal policy that would bring about excellent results.

The plan of operation should, of course, be left to the governing board, but the bill should specify the scope of the survey, which should include both the geology and the natural history of the state. This is the belief of those who have had much to do with the older surveys.

The expense should be modest for a beginning, and the work should be developed as necessities may warrant, or men of ability in special lines may be secured. A tax of one tenth mill for fish and game produces a revenue of from $17,000 to $18,000. A tax of equal amount for a state survey will give it a good start and make it possible to do most valuable work. An appropriation of not less than $10,000, and possibly $15,000, will enable the work to start at once with sufficient breadth to develop in several directions.

The work of the survey will take many years. Most of the work in the field will be in the summer. I doubt not men from the state institutions can be secured without big outlay for salary. This is at least to be expected. It will no doubt take years to carry out some of the outlines that will develop. Men living in the state who are in the employ of the state and who are fitted should be most valuable in many ways. Others not in state institutions will be found who will no doubt gladly assist, and there are many such who are competent. There is a long list of competent men to be found in the state, competent for some one line of work, at least. A few of these are already on the roll of the academy; more of them should be.

The above plan is, I believe, feasible. In one year the legislature meets. The state is in good financial condition. There is no reason why the survey should not be started. Some one must start it. The academy should foster the move. I advocated the move last year at our first meeting. I repeat it and urge action on the part of the academy. Speak of it through the press. Present it to those who have influence. If we all work zealously and earnestly it will surely go.

MORTON J. ELROD.
UNIVERSITY OF MONTANA,
MISSOULA, MONT.

SCIENTIFIC BOOKS.

The Harriman Alaska Expedition. Vol. III., *Glaciers and Glaciation.* By GROVE KARL GILBERT, pp. i–xii, 1–231; 18 plates and 106 figures. Vol. IV., *Geology and Paleontology.* By B. K. EMERSON, CHARLES PALACHE, WILLIAM H. DALL, E. O. ULRICH and F. H. KNOWLTON, pp. i–x, 1–173; 33 plates and 18 figures. Published by Doubleday, Page and Company, New York, 1904. Size 7 by 10 inches.

Volumes one and two of the Harriman Alaska Expedition, containing a narrative of the journey and treating of the glaciers, natives, history, geography and resources of Alaska, were published in 1901. The two volumes recently issued are of special interest to geologists, and still others, as is understood, devoted to botany and zoology, are yet to come.

The Harriman Expedition, it will be remembered, was primarily a journey for pleasure and recreation, which twenty-three literary and scientific men were invited to accompany and it became a scientific reconnaissance embracing a wide range of subjects. The expedition

was conducted munificently and the series of sumptuous reports in process of publication under the editorship of Dr. C. Hart Merriam, are in keeping with the princely spirit manifest throughout the undertaking. The volumes that have appeared command attention and invite examination on account of their elegance and the good taste displayed by them. The artistic spirit which pervades them, although prominent, is subordinated to the faithful presentation of scientific results. The series of reports when completed will form a monument to the broad-mindedness of the originator of the expedition, such as no shaft of sculptured marble could furnish.

There is another point of view, however, from which the beauty and costliness of dress of the volumes in question may be considered. They are issued by a publishing house at $7.50 per volume, a price which puts them beyond the reach of many persons who would be glad to possess them. Although final reports so far as the Harriman Expedition is concerned, in reality they contain only the returns from a rapid reconnaissance. The distance from Puget Sound to Plover Bay, Siberia, and return, over eight thousand miles, was traversed by the expedition in fifty-eight days. As reports of such a voyage, during which much time was consumed in unprofitable travel, is it becoming to publish in so costly a manner? The thick paper, title pages in red and black, gilt tops, scores of plates, many of them in colors, tinted sketch-maps, vignettes, artistic chapter headings, etc., of these beautiful specimens of the bookmaker's art, like Easter bonnets and jeweled rings, are open to the criticism that the money they represent could have been better spent.

Glaciers and Glaciation.—Of all the branches of science represented by the men who accompanied the Harriman Expedition, the opportunities for study were certainly more favorable for the glacialist and the student of topographic forms than for any one else. At almost any locality from Puget Sound to the Aleutian Islands, where land is in sight, the student of glaciers and of the changes they make in the shapes of valleys, etc., can find material of special significance. In this connection Gilbert says:

> The glacier-bearing belt includes about three tenths of the vast territory of Alaska. Its exploration has but begun, yet enough is known to give it rank as the third great glacier district of the world, only the Antarctic continent and Greenland surpass it. Its ice may be roughly estimated to occupy a tenth of the surface, or an absolute area of between 15,000 and 20,000 square miles, and its expanse is so divided and scattered as to offer to the student the utmost variety of local conditions and detail. Of alpine glaciers, such as would receive individual names if near the homes of men, there are many hundreds, possibly more than a thousand; of broad, composite fields, like the Muir and Malaspina, there are about a half dozen; and more than thirty are known to reach the coast and cast bergs into the sea.

Of the vast mantle of snow and ice covering so much of Alaska, the members of the Harriman Expedition saw only a portion of the lower fringe. In southeastern Alaska and extending as far west as Yakutat Bay, the ground gone over by previous explorers was reviewed and many new facts obtained, and several modifications of previous conclusions arrived at. To the west of Yakutat Bay, and especially in the region of Prince William Sound, a fresh field for glacial studies was discovered and many important observations in reference to the distribution of glaciers, their fluctuations in length, etc., put on record. More than a dozen alpine glaciers of large size were discovered and several emptying into College Fiord were named in honor of American colleges and universities. The chief addition made to previous knowledge of the geography of the coast was the discovery of Harriman Fiord, a magnificent glaciated valley now in part occupied by the water of the sea, with many glaciers on its border, and a superb tidal glacier at its head.

The principal observations pertaining to existing glaciers presented by Gilbert may be conveniently grouped in five categories:

1. The distal ends of glaciers which terminate in the sea are shown to undergo fluctuations in length owing to seasonal changes in atmospheric conditions. These variations

are so pronounced that comparisons of the records of the position of the ice-wall of a tidal glacier made in different years need to be corrected for the time of year.

2. The influence on shore topography of the waves generated by bodies of ice which fall from tidal glaciers, or 'ice-fall waves,' is noted for the first time, and the possible influence of such waves on the shore features of partially ice-walled Pleistocene lakes suggested.

3. Anomalies in the fluctuations of neighboring alpine glaciers, as, for example, when one advances and another in an adjacent valley recedes, find many illustrations in Alaska. A discussion of the possible causes of such discordant changes when the conditions on which they are believed to depend are general and wide reaching is presented and is most suggestive.

4. The peculiar steep-sided depressions, many of them containing lakes, well known in certain formerly glaciated regions, are illustrated in the gravel deposits in front of several of the Alaskan glaciers which have recently retreated. The explanation of the origin of such depressions, first advanced, I believe by Professor W. O. Crosby, is that they are due to the melting of detached bodies of ice that were surrounded or covered by gravel deposits. The discovery of additional recent and typical examples of this nature by Gilbert gives greater confidence in the commonly accepted explanation.

5. A characteristic feature of the topography of formerly glaciated mountains is the occurrence, on the sides of the valleys once occupied by main or trunk glaciers, of tributary glaciated valleys which open into the main valleys high above their bottoms. Such tributary valleys have been termed 'hanging valleys.' The coast of British Columbia and southeastern and southern Alaska is exceptionally favorable for the study of the topographic features referred to; and in the volume under review several characteristic examples are described and admirable pictures of them presented.

The author favors the view that hanging valleys are due to the greater erosive power of a large trunk glacier over that of its shallower tributaries. That is, the discrepancy between the level of the bottom of a hanging valley and the bottom of the larger valley into which it opens is due to differential ice-erosion; the idea being that the surfaces of two glaciers which unite, are on the same level, while the bottoms of the valleys they occupy are deepened so as to be adjusted respectively to the thickness of the ice streams occupying them.

The explanation of the origin of hanging valleys by differential ice-erosion, while clearly and forcibly presented by the author, will, I think, fail to satisfy many persons who are familiar with the topography of formerly glaciated mountains. In view of the fact that Professor J. C. Branner reports hanging valleys on the Hawaiian Islands, where no suggestion of former glaciation can be claimed (*Am. Jour. Sci.*, Vol. XVI., 1903, p. 301), and that Gilbert in the volume under review with characteristic candor presents a sketch of a representative example in the mountain-wall of Plover Bay, Siberia, where concurrent evidence of glaciation is absent, suggest that at least two sets of conditions may have produced similar topographic forms. Again, in well glaciated mountains like the Cascades and Sierra Nevada, the great differences in level between a main valley and its tributary hanging-valleys, amounting in some observed instances to 1,500 or 2,000 feet, and this where the main valley is short and has but a comparatively small gathering ground for snow, must needs make the conservative glacialist pause before accepting the conclusion that such great discrepancies are due solely to differential ice-erosion. Other considerations in this connection might be mentioned, such as the fact that a deep glaciated valley with hanging valleys along its sides not infrequently heads against a cliff, and its direct continuation above the cliff also has the characteristic of a hanging valley. Then, too, hanging valleys may be claimed to occur on the sides of steep mountains, and on slopes overlooking the sea, where no evidence of a controlling ice body at a lower level is obtainable.

The above suggestions are presented and others might be added, for the purpose of indicating that the explanation of the origin of

hanging valleys, presented by Gilbert, although seemingly complete and unassailable, is perhaps not final.

In the volume under review the term 'tidal glacier' is substituted for the previously used and longer term 'tide-water glacier,' to designate ice streams which end in the sea. This substitution is welcome on account of its greater brevity, but I doubt if its meaning will be as readily grasped by the general reader as in the case of the longer term.

In the sections presented by Gilbert of the ends of tidal glaciers, the ice is represented as overhanging, and the only mode of formation of bergs that is recognized is from the breaking away of exposed portions of an ice cliff and their fall into the water at its base. The view is favored that the sea water causes a more rapid melting of the submerged portion of a glacier which advances into it, than occurs on the part of the ice above water. There can be no difference of opinion in this connection so far as the formation of most bergs from the glaciers of Alaska is concerned, but the 'blue bergs' which occasionally rise to the surface of the water at a distance of several hundred, and as estimates indicate, fully a thousand feet in some instances, in front of the visible ice-cliff of a tidal glacier, certainly indicate exceptional conditions. The birth of bergs from the extended submerged extremity of a glacier does not seem to have been observed during the Harriman Expedition.

In a chapter bearing the caption, 'General Considerations as to Glaciers,' four groups of features are discussed. (1) The broader characters of the surfaces of the lower portion of a glacier, or the 'glacier proper,' such as its evenness of surface as compared with the contours of the rock-floor on which it rests; lateral ice-cliffs due to heat reflected from the adjacent land and the influence of margining streams; and 'crevass cycle,' or the sequence of changes a series of crevasses, such as forms below an ice cascade, pass through. (2) Glacial sculpture, in the consideration of which the conspicuously different results produced by abrasion and 'plucking' are described and illustrated by photographs and sketches. (3) The pressure and erosive power of tidal glaciers, in the consideration of which an interesting theoretical discussion is indulged in in reference to the manner in which the distal end of a tidal glacier is supported. (4) The resemblances, differences, homologies and analogies of streams of water and glaciers, are clearly and most instructively indicated.

As I have attempted to show, Gilbert's sumptuous volume is most welcome to the special student of glaciers, both on account of the new facts it contains and of the new thoughts presented. It is clearly and concisely written, and must appeal to the general reader and entice him to make still more arduous journeys through the fields of glacial literature. One of its chief values is as a reading lesson for advanced students in college classes.

Geology and Paleontology.—Volume IV. of the Harriman Alaska Expedition bears internal evidence of being based on a reconnaissance much more clearly than its companion volume on glaciers and glaciation. Its table of contents reads: 'Introduction,' by G. K. Gilbert; 'General Geology,' by B. K. Emerson; 'The Alaska-Treadwell Mine,' 'Geology about Chichagof Cove,' and 'Minerals,' by Charles Palache; 'Mesozoic Invertebrate Fossils,' by William H. Dall; 'Fossils and Age of the Yakutat Formation,' by E. O. Ulrich and 'Fossil Plants from Kukak Bay,' by F. H. Knowlton.

A noteworthy result of the geological studies, as is stated by Gilbert in the introductory chapter, is the correlation on fossil evidence of slates and shales in three widely separated localities—Yakutat Bay, Prince William Sound and Kadiak Island—and the determination of their age as Jurassic. The correlation referred to of terranes in areas over 500 miles apart, as stated by Ulrich, 'is by means of a fossil species of definite character, *Terebellina palachei,* common to them all.' This fossil is the type of a new genus of burrowing worm, of which only the tubes it made, composed of cemented sand-grains, have been discovered. The assignment of a Liassic (Lower Jurassic) age is based mainly on four species of algæ belonging to two genera which

have been identified with European forms. One of the genera is reported only from the Lias and the other ranges from the Lias to the Trias and Tertiary. Besides these fucoids, the worm tubes referred to above and a new genus of lamellibranch are used in determining geological age; as stated in the text, the evidence furnished by the worm-burrows and the molluscan shell is purely inferential, but so far as it goes corroborates that of the fossil algæ as to a Liassic age. To one who is not an expert in paleontology, the arguments presented both as to correlating the widely separated terranes now referred to the Yakutat formation, and the assignment of that formation to a subdivision of the Jurassic, seem based on meager data. Among the results presented by the geologist is the evidence of Eocene strata on the Alaskan peninsula. The fossils collected at various localities form the basis for describing thirty-eight new species, twelve Jurassic and the remainder Tertiary. The Jurassic fossils include seven new genera. The descriptions of new species are accompanied by twenty-five admirable plates.

In the chapter on general geology, page 12, in describing the basaltic region about Shoshone Falls, Idaho, mention is made of 'great pustules which had been inflated on the surface of the liquid mass and then congealed and collapsed.' This explanation of the origin of the numerous 'pressure ridges' of the Snake River lava plains is so widely at variance with the conclusion reached by myself after gaining considerable familiarity with them, that it seems advisable to refer the reader to a more extended account of their characteristic, namely, U. S. Geological Survey, Bulletin No. 199, 1902, pp. 95–96.

The advantages presented by Alaska for glacial studies has already been referred to, and the reports of the geologists of the Harriman expedition, if we had no other evidence, suffice to show that the same land has an instructive geological history. Although the reports under review contain a few admirable pictures of volcanoes, only one, Bogoslof, seems to have been visited. As is well known, however, the volcanoes of Alaska present a subject for study fully as extensive and equally instructive as its glaciers, but one concerning which but little definite information is available. Another region of special interest which invites investigation and gives promise of valuable return is the vast tunda in the far north. Concerning one of these great groups of earth features, namely, the glaciers, the Harriman expedition has done good service not only in recorded results, but in indicating the richness of the field that remains to be explored. The others, as is well known, are fully as important and equally inviting. The suggestion I wish to convey by these statements is that there are room and material for study in Alaska for many more expeditions. The great and lasting results recorded in the reports of the Harriman expedition should encourage other broad-minded citizens to immortalize their names in a similar manner.

ISRAEL C. RUSSELL.

SOCIETIES AND ACADEMIES.

THE MICHIGAN ACADEMY OF SCIENCE.

THE tenth annual meeting of the Michigan Academy of Science was held at Ann Arbor, on March 31 and April 1 and 2. The new medical building, the university museum and the laboratories of botany and zoology of the University of Michigan were placed at the disposal of the academy for its sessions. The officers for this meeting were:

President—Professor F. C. Newcombe, Ann Arbor.

Vice-Presidents—Section of Agriculture, Professor W. J. Beal, Agricultural College; Section of Botany, Mr. B. O. Longyear, Agricultural College; Section of Geography and Geology, Professor I. C. Russell, Ann Arbor; Section of Sanitary Science, Professor C. E. Marshall, Agricultural College; Section of Zoology, Professor R. H. Pettit, Agricultural College.

Treasurer—Professor H. L. Clark, Olivet.

Librarian—Dr. G. P. Burns, Ann Arbor.

Secretary—Dr. Jas. B. Pollock, Ann Arbor.

The meeting opened Thursday, March 31, with a general business session at 2 P.M. Following the adjournment of this general session the various sections met for the reading of papers. Thursday evening no session

of the academy was held, as the members were invited to attend the dedication of the new science building at the State Normal College at Ypsilanti, Mich. Friday forenoon was devoted to the reading of papers in the various sections. In the afternoon the academy convened in general session and the retiring president, Professor F. C. Newcombe, of the University of Michigan, delivered the presidential address, taking as his subject 'The Manner and Means of a Natural History Survey of Michigan.' This address will be published in full in the annual report of the academy. The subject is one to which the academy is devoting much attention, and it is hoped that at the next session of the state legislature a law will be passed authorizing a natural history survey for Michigan, similar to those already established in other states. Following the presidential address the remainder of the Friday afternoon session was devoted to a discussion of the 'Forestry Interests of Michigan,' with the following program:

Charles W. Garfield, president State Forestry Commission, Grand Rapids: 'The State's Work in Forestry.'

John Bissel, Detroit: 'Forestry of Michigan from a Business Man's Standpoint.'

Filibert Roth, University of Michigan, Ann Arbor: 'The Next Step in Forestry in Michigan.'

J. W. Clark, of the U. S. Bureau of Forestry, Washington, D. C.: 'The Work of the Bureau of Forestry in Michigan.'

W. J. Beal, Agricultural College: 'Lantern Views of Seedlings and Young Forest Trees.'

E. E. Bogue, Agricultural College: 'Forestry Plantations in Michigan.'

C. A. Davis, University of Michigan, Ann Arbor: 'Condition of the Wood Lot in Michigan.'

On Friday evening Professor John M. Coulter, of the University of Chicago, delivered the annual address in Sarah Caswell Angell Hall. The subject was 'A Neglected Naturalist,' and under this title a most interesting account of the life and work of Rafinesque was given. Immediately following Professor Coulter's address the visiting members of the academy were the guests of the Research Club of the University of Michigan at an informal reception and smoker.

On Saturday morning a general session was devoted to a discussion of the 'Fish and Game Interests of Michigan.' The following papers were presented at this time:

F. N. Clark, Supt. of U. S. Fish Hatchery, Northville: 'Commercial Fish and Fisheries.'

Charles E. Brewster, Chief Deputy, Department of Game and Fish Warden, Sault Ste. Marie: 'The Commercial Fishes of the Great Lakes.'

F. B. Dickerson, of the Michigan Fish Commission, Detroit: 'The Benefit to the State of the Artificial Propagation of Game Fish.'

C. H. Chapman, State Game Warden: 'Game Animals.'

L. Whitney Watkins, of the Agriculture College Board, Manchester: 'Game Birds.' (By title.)

In the meetings of the various sections of the academy the following papers were read:

SECTION OF BOTANY.

G. P. Burns, Ann Arbor: 'Ecological Survey of the Huron River Valley, IV., Dead Lake.'

Miss Lura Warner, Ann Arbor: 'Regeneration of Root Tips after Splitting.'

Miss Mary E. Hedden, Ann Arbor: 'Conditions Influencing Regeneration of the Hypocotyl in *Linum usitatissimum*.'

Miss Annabel W. Clark, Ann Arbor: 'Regeneration of the Epicotyl in Seedlings of *Vicia Faba* and *Pisum sativum*.'

Miss Julia A. Haynes, Ann Arbor: 'Angle of Deviation at which Stems Show the Strongest Response.'

W. N. Fuller, Ann Arbor: 'Statocyst Function of Starch Grains in the Root Tip.' (By title.)

A. W. Pierson, Ann Arbor: 'The Occurrence of *Basisporium Gallarum* Molliard in Michigan.'

C. A. Davis, Ann Arbor: 'The Rough Barked and Smooth Barked White Oaks.'

F. H. Loew, Agricultural College: 'Importance of Plant Variation and Its Bearing on the Evolution of Species.'

S. Alexander, Detroit: 'Some Interesting Michigan Plants, Possibly Some New Species.'

W. J. Beal, Agricultural College: 'A New Edition of the Michigan Flora.'

J. B. Dandeno, Agricultural College: 'The Relation of Mass Action and Physical Affinity to Toxicity of Solution.'

E. E. Bogue, Agricultural College: 'Educational Requirements for the Profession of Forestry.' (By title.)

W. J. BEAL, Agricultural College: 'Extension Work in Agriculture.'

SECTION OF ZOOLOGY.

RAYMOND PEARL and MISS MARY H. BURR, Ann Arbor: 'A Statistical Study of Conjugation in *Paramœcium*.'

MISS FRANCES J. DUNBAR, Ann Arbor: 'Methods Used in Cultivating Pure Strains of *Paramœcium*.'

MISS JEAN DAWSON, Ann Arbor: 'On the Occurrence of a Gill in *Planorbis*.'

BRYANT WALKER, Detroit: 'Variation in the Forms of *Succinea ovalis*.'

A. G. RUTHVEN, Ann Arbor: 'Notes on the Mollusks, Reptiles and Amphibians of Porcupine Mountains, Mich.'

J. PLAYFAIR MCMURRICH, Ann Arbor: 'A New Type of Cerianthid and Its Significance.' (By title.)

ELLIS MICHAEL, Ann Arbor: 'Fish Fauna of Michigan.'

H. L. CLARK, Olivet: 'A Michigan Biological Survey.'

J. E. DUERDEN, Ann Arbor: 'The Antiquity of the Zoanthid Actinians.'

H. L. CLARK, Olivet: 'Snake Notes,' illustrated with specimens.

H. L. CLARK, Olivet: 'The Variability of Snakes.'

C. F. CURTIS RILEY, Ann Arbor: 'Some Reactions of the Agrionidæ Larvæ.'

S. J. HOLMES, Ann Arbor: 'Some Observations on Phototaxis.'

J. E. DUERDEN, Ann Arbor: 'An Exhibit Showing Commensalism of Crab and Actinian.'

SECTION OF GEOGRAPHY AND GEOLOGY.

FRANK LEVERETT, Ann Arbor: 'Bed Rock Topography of the Southern Peninsula of Michigan.'

A. C. LANE, Lansing: 'The Theory of Copper Deposition.'

A. C. LANE, Lansing: 'The Development of the Igneous Magma.'

A. C. LANE, Lansing: 'Artesian Wells Along the North Shore of Lake Michigan.'

I. C. RUSSELL, Ann Arbor: 'The Glaciers of the Three Sister Peaks, Oregon,' illustrated.

FRANK LEVERETT, Ann Arbor: 'The Glacial Geology of the Ann Arbor Quadrangle.' (By title.)

ISAIAH BOWMAN, Ypsilanti: 'A Case of Steam Capture at Rawsonville, Michigan.'

H. W. BERGER: 'Gravel Deposits on Marl at the Shore of Bass Lake, Livingston County, Michigan.'

I. C. RUSSELL, Ann Arbor: 'Lava Flows of the Deschutes Valley, Oregon,' illustrated. (By title.)

M. S. W. JEFFERSON, Ypsilanti: 'The Valley of the Yuma River, Cuba,' illustrated.

M. S. W. JEFFERSON, Ypsilanti: 'Wind Effects.'

F. W. KELSEY, Ann Arbor: 'Vesuvius Before the Eruption of '79.'

SECTION OF SANITARY SCIENCE.

T. B. COOLEY: 'Report of the Pasteur Institute for the Year Ending April 1, 1904.'

MORTIMER WILLSON: 'Personal Hygiene for Life's Afternoon.'

GUY S. KIEFER: 'Some Problems in Sanitary Science.'

MISS CARRIE A. LYFORD: 'Domestic Science in Its Relation to Sanitary Science.'

MISS JENNETTE CARPENTER: 'The Object of Cookery in Schools.'

FLOYD W. ROBISON: 'Iron and Fiber in Their Relation to the Food of Man.'

V. C. VAUGHAN: 'The Result of Sixteen Years of Work in the Bacteriological Examination of Drinking Water.'

RALSTON WILLIAMS: 'Typhoid Germs in Sewage.'

T. F. MARSTON: 'What Pure Milk Production Means to the Producer.' (By title.)

IRA O. JOHNSON: 'The Significance and Production of Walker-Gordon Milk.'

CHARLES E. MARSHALL: 'Associative Action of Bacteria in the Souring of Milk.'

H. B. BAKER: 'A Problem in Terrestrial Physics—What Causes the Earth's Rotation.'

T. B. COOLEY: 'Gun Shot Wounds and Tetanus.'

D. J. LEVY: 'Filtration of Enzymes.'

FRED MUNSON and W. R. SPENCER: 'A Preliminary Report on the Presence of Toxin in Liver Cells.'

DONALD MCINTYRE: 'The Intercellular Toxin of B. pyocyaneus.'

M. W. CLIFT: 'The Chemical Tests for Morphine in the Presence of Putrefactive Substances.'

D. J. LEVY: 'An Actinomyces Isolated from Man.'

L. M. GELSTON: 'Filtration of Virus of Rabies Through Paper.'

WARD J. MCNEAL: 'An Improved Medium for Cultivating Trypanosoma Brucei.'

F. G. NOVY and W. J. MCNEAL: 'Cultivation of Trypanosoma Evansi.'

F. G. NOVY and W. J. MCNEAL: 'Filtration and Agglutination of Trypanosomes.'

H. R. TERREY: 'A New Phosphorescing Organism.'

At the final business meeting on Saturday morning the following officers were elected for the ensuing year:

President—Dr. A. C. Lane, State Geologist, Lansing.

Vice-Presidents—Section of Agriculture, Professor W. J. Beal, Agricultural College; Section of Botany, Professor J. B. Dandeno, Agricultural College; Section of Geography and Geology, Professor M. S. W. Jefferson, State Normal College; Section of Sanitary Science, Dr. T. B. Cooley, director of the Pasteur Institute, Ann Arbor; Section of Science Teaching, Professor W. H. Sherzer, State Normal College; Section of Zoology, Dr. Raymond Pearl, University of Michigan.

Secretary and Treasurer—Professor C. E. Marshall, Agricultural College.

Librarian—Dr. G. P. Burns, University of Michigan.

At this meeting the academy voted to commence the publication of a bulletin, in addition to the annual reports now being issued. The bulletin will appear three times during the year, and will be in charge of an editorial committee consisting of the president, the secretary and Professor H. L. Clark, of Olivet. The principal object of this bulletin will be to disseminate among the people of the state who are interested in science, and especially among the teachers of science in the secondary schools, more information regarding the work the Academy of Science is doing than they now get from the existing publication.

Raymond Pearl.

THE IOWA ACADEMY OF SCIENCES.

The eighteenth annual meeting of the Iowa academy was held in the physical lecture room of the State University of Iowa, Iowa City, April 14 and 15. The following papers were presented:

Bruce Fink: President's address, 'Two Centuries of American Lichenology.'

Gilbert L. Houser: 'The Animal Cell in the Light of Recent Work.'

W. S. Hendrixson: 'The Action of Chloric Acid on Metals.'

Gershom H. Hill: 'The Importance of Vital Statistics in the Study of Social Science.'

T. E. Savage: 'A Buried Peat Bed and Associated Deposits in Dodge Township, Union County.'

L. H. Pammel: 'Some Notes on Iowa Flora.'

Nicholas Knight: 'Some Features in the Analysis of Dolomite Rock.'

Nicholas Knight: 'The Softening of Hard Water.'

L. H. Pammel, Edna King and R. E. Buchanan: 'Some Bacteriological Examinations of Iowa Waters.'

Launcelot W. Andrews: 'The Determination of Chlorides by Means of Silver Chromate.'

Arthur W. Martin: 'A Chemical Study of *Rhus glabra*.'

J. E. Guthrie: "The 'Furcula' in the Collembola."

R. I. Cratty: 'The Flora of Emmet County, Iowa.'

W. M. Barr: 'Action of Sodium Thiosulphate on Silver Salts.'

John J. Lambert: 'Regeneration in the Crayfish.'

C. F. Lorenz: 'Single Lantern Stereoscopic Projection in Color.'

G. E. Finch: 'Notes on the Position of *Nileus vigilans* in Strata at Elgin, Iowa.'

R. E. Buchanan: 'The Development of the Plum, *Prunus americana*.'

B. Shimek: 'Additions to the Iowa Flora.'

H. W. Norris: 'The so-called Dorsotrachealis Branch of the Seventh Cranial Nerve in *Amphiuma*.'

H. W. Norris: 'The Vagus and Anterior Spinal Nerves in *Amphiuma*.'

Katy A. Miller: "The Lichen Flora of 'The Ledges,' Boone County, Iowa.'

W. S. Hendrixson: 'A Method of Determining Chloric Acid.'

Harriet M. Clearman: 'A Geological Situation in the Lava Flow, with Reference to the Vegetation.'

John C. Frazee: 'Synthesis of Ethyl Alcohol from Acetylene.'

Edwin Morrison: 'Old Experiments with New Apparatus.'

H. A. Mueller: 'A Preliminary List of the Flowering Plants of Madison County.'

Charles R. Keyes: 'Remarkable Occurrence of Aurichalcite.'

Charles R. Keyes: 'Certain Basin Features of the High Plateau Region of Southwestern United States.'

Charles R. Keyes: 'Note on the Carboniferous Faunas of the Mississippi Valley in the Rocky Mountain Region.'

L. Begeman: 'A Convenient Voltaic Cell.'

F. Bonnet: 'A New Method of Determining Compressibility of Liquids and Solids.'

Officers for the ensuing year were elected as follows:

President—B. Shimek, Iowa City.
First Vice-President—L. H. Pammel, Ames.
Second Vice-President—M. F. Arey, Cedar Falls.
Secretary—T. E. Savage, Capitol Building, Des Moines.
Treasurer—H. W. Norris, Grinnell.

H. W. NORRIS,
Secretary.

THE RESEARCH CLUB OF THE UNIVERSITY OF MICHIGAN.

THE following papers unreported in SCIENCE have been read at recent meetings of the club: At the December meeting Dr. A. B. Prescott gave an account of work upon the 'Organic Perhalides' done in his laboratory from 1895 to 1900. He had been attracted to this field (1) from the interest of the relations between perhalides and the double halides, (2) because of the molecular significance of supercompounds as such, (3) by reason of the remarkable rôle of iodine in the iodonium bases made known in 1894, (4) on account of the singular individuality of the periodides of the organic bases formed by nitrogen, and (5) in order to pursue the question, what sort of basal constitution is necessary to a perhalide. The systematic production of all perhalides of pyridine was entered upon, followed by those of the picolines, quinoline and the common vegetable bases, as has been published from this work up to 1901. In continuation the author desires to so extend the study as to find something of whatever value perhalide formation possesses as a distinguishing measure of chemical character, and whether or not confined to 'salt-forming bases.'

At the same meeting Dr. A. S. Warthin gave a summary of his most recent work on the hæmolymph glands as he had found them in man and other animals.

At the February meeting Professors Asaph Hall and F. C. Newcombe gave an account of their researches. After explaining various methods employed in detecting errors of division in circles, Professor Hall submitted a table showing the division errors of the Lick meridian circle constructed by the Repsolds, of that at Washington by Pistor and Martins, and of that at Ann Arbor, also by Pistor and Martins.

For the first two instruments the errors were obtained by keeping one circle fixed on the axis and continually shifting the other. For the Ann Arbor circle the errors were found by the methods of Bessel for the determination of special marks giving the following values for the ten degree divisions:

Division.	Error.
°	″
0	0.00
10	— 0.36
20	— 0.58
30	— 0.54
40	— 0.67
50	— 0.66
60	— 0.64
70	— 0.10
80	+ 0.21

Professor Newcombe stated that the roots of many species of plants are known to bend against the current of a stream of water in which they may be placed. This rheotropic response was shown to be really a response to one-sided pressure, since the roots showed similar curves when they were wholly shielded from the stream of water by covering them with tubes of very thin collodion. The thigmotropism must be called forth either by the large extent of surface stimulated by the water stream, or by long continued irritation of the same cells in the sensory region, conditions which will rarely if ever be fulfilled in nature. The conclusion was drawn that, contrary to the general belief, terrestrial roots are not responsive to one-sided pressure such as they meet in nature.

At the March meeting Professor Wenley spoke on the relation of Plato's writings to modern research, and Professor Cushny discussed 'The Secretion of Acid by the Kidney.' Professor Cushny assumed that the renal tubules are chiefly engaged in absorbing some of the constituents of the glomerular fluid. By the intravenous injection of most neutral salts the urine was found neutral or feebly acid to phenolphthalein, while it was neutral or alkaline to litmus. The intravenous injection of phosphate rendered the urine acid to

phenolphthalein, while it was feebly acid or neutral to litmus; obstruction of one ureter now rendered the urine of that side more strongly acid. This was interpreted as indicating that the normal acidity of the urine is due to the absorption of sodium and hydroxyl or carbonate ions in the renal tubules. For the secretion of acid urine two conditions must be fulfilled: (1) There must be present in the blood and glomerular fluid a hydrolytically dissociated salt whose anion can not permeate the epithelium of the tubules, while the cation can permeate readily; (2) there must be an active absorption in the tubules.

FREDERICK C. NEWCOMBE,
Secretary.

THE AMERICAN MATHEMATICAL SOCIETY.

DURING the month of April the American Mathematical Society held three meetings. The Chicago Section met at Northwestern University on April 2, the San Francisco Section at Stanford University on April 30, and a regular meeting of the society was held at Columbia University, also on April 30. Reports of the sectional meetings will appear later in SCIENCE.

About fifty members attended the regular meeting in New York. The president of the society, Professor Thomas S. Fiske, occupied the chair. The following persons were elected to membership: J. J. Browne, Colorado School of Mines; C. E. Dimick, University of Pennsylvania; Wm. Gillespie, Princeton University; Clifford Gray, Columbia University; Louis Ingold, University of Missouri; Myrtle Knepper, State Normal School, Cape Girardeau, Mo.; F. M. Morrison, Buchtel College; G. W. Myers, University of Chicago; Elijah Swift, Harvard University. Eight applications for admission to membership were received.

During the past year two important reports have been prepared by committees of the society and published in the *Bulletin*. The report of the committee on college entrance requirements has been adopted by the College Entrance Examination Board as the basis of its examinations in mathematics on and after June, 1905. The second report, prepared by a committee of the Chicago Section, presents a unified scheme of requirements for the master's degree for candidates offering mathematics as the major subject. The society has also exerted, through its committee on relations to elementary mathematics, a guiding influence in the formation of associations of teachers of mathematics throughout the country. Several of these associations have already been organized under very favorable prospects, and others are already planned.

The following papers were read at the April meeting:

H. F. STECKER: 'Certain differential equations in relation to non-euclidean geometry.'

C. J. KEYSER: 'Certain line and plane quintic configurations in point 4-space, and their sphere analogues in ordinary space.'

E. V. HUNTINGTON: 'A set of independent postulates for the algebra of logic (third paper).'

O. D. KELLOGG: 'Sets of functions with preassigned singular points and monodromic group.'

J. M. PEIRCE: 'On certain complete systems of quaternion expressions and on the removal of metric limitations from the calculus of quaternions.'

E. O. LOVETT: 'Singular trajectories in the problem of four bodies.'

E. O. LOVETT: 'Systems of periplegmatic orbits.'

M. BÔCHER: 'The Gauss-Stieltjes equilibrium problem and the roots of polynomials.'

J. PIERPONT: 'On multiple integrals.'

E. L. DODD: 'Multiple sequences.'

V. SNYDER: 'On developable and tubular surfaces having spherical lines of curvature.'

C. H. SISAM: 'On self-dual scrolls.'

E. KASNER: 'The general transformation theory of differential elements.'

E. J. WILCZYNSKI: 'General theory of curves on ruled surfaces.'

H. TABER: 'On real hypercomplex number systems.'

For the evening the usual dinner was arranged; twenty-five members attended this agreeable diversion.

The summer meeting of the society will be held at St. Louis on September 16–17. The San Francisco Section will also meet in September. The next meeting of the Chicago Section will be held at the Christmas holidays.

F. N. COLE,
Secretary.

THE TORREY BOTANICAL CLUB.

THE meeting of February 24 was held at the New York Botanical Garden, Professor Underwood in the chair; sixteen persons present.

Dr. Britton referred to the opportunity of members to become applicants for a grant of fifty dollars from the John Strong Newberry Fund, which this year is available for botanical or zoological research.

The announced paper of the scientific program was by Mr. Percy Wilson under the title of 'Remarks on some Economic Plants of the East Indies.'

In the spring of 1901 Mr. Wilson was commissioned by the New York Botanical Garden to accompany the solar eclipse expedition to the East Indies organized by Professor Todd, of Amherst College, the chief purpose of Mr. Wilson's visit being to obtain collections of native plants and plant products for exhibition in the museum of the garden. Most of his collections were made on the island of Singkep, which is a two days' voyage southward from Singapore. This island is about twenty-five miles in length and sixteen in greatest width. Two thirds of it is covered with a dense tropical jungle, the remainder having small, scattered native villages. Various fiber products, starches and sugars, manufactured and used by the inhabitants of these villages, were shown. In discussing fiber products, examples were first exhibited in which a whole leaf or a considerable part of it is made use of. Of these leaf fibers, one of the most extensively utilized is from the leaves of the screw pines, whose generic name, *Pandanus*, is a Latinized form of the Malay word 'pandan,' a name applied to many species of the genus. In many of the East Indian islands, large tracts are covered by these *Pandanus* trees or shrubs, growing in such profusion as to form impenetrable masses of vegetation, while species growing singly or a few together abound principally in the vicinity of the sea. The latter bear many thick aerial roots, which at a distance have the appearance of supporting the plant in the air. The leaves and roots are the parts of chief economic importance. The leaves are gathered in large numbers, tied into bundles, and carried by the men to the villages, where the women remove with a large knife all spines from the margins of the leaf and the under surface of the midrib. The leaves are then exposed to fire, after which they are cut singly with a sharp four-bladed knife into strips of uniform width. After several days of soaking in water and bleaching in the sun, each strip is separately drawn between the thumb and a thin bamboo stick. By this treatment they become flexible and can be wrought into any desirable shape without injury to the fiber. Two plants in particular, 'pandan tikar' (*Pandanus Samak*), the mat screw-pine, and 'pandan laut' (*Pandanus fascicularis*), the seashore screw-pine, are considered as yielding the best grade of leaves for mat- and basket-weaving. Other species bearing larger and coarser leaves are regarded as inferior. Of these, the 'mengkuang' (*P. atrocarpus*), an arboreal form, is commonly found in swampy places. The leaves of this are made into hats, and into large mats which often serve for the entire sides of houses or for the covering of carts. Styles and designs in weaving differ in the different islands. In some places highly colored mats with red, green, brown and purple strips interwoven are to be found. The dyes used are said to be chiefly of vegetable origin. A red dye is extracted from the leaves of the teak, a green from the shoots of the banana, while brown or chocolate color is obtained by burying the strips in mud and water for several weeks. In some regions where species of *Pandanus* abound, these thick aerial roots are used for corks; sections of these roots several inches in length are beaten out at one end and thus made to serve as brushes. Leaf fibers from the leaflets of the 'nipah' (*Nipa fruticans*), a low, stemless palm, are woven into large shingles known as 'attaps.'

Fibers derived from the vascular bundles alone are obtained from the leaf-stalks of a common fern, *Dicranopteris linearis*. After the long bundles are split out from the stalks they are drawn separately through a series of holes of gradually diminishing sizes punctured in a piece of tin. With the strong fiber thus

obtained fine hats are made which are worn by the Malay men at their various festivals. The stems of the bamboo or strips and fibers obtained from them are put to a great variety of uses by the natives of the region.

Various food products of vegetable origin were then discussed. An important starch is sago, under which name are understood starches derived from several kinds of palms and cycads. Most of it, probably, comes from the trunk of *Metroxylon Sagu,* the true sago palm, which inhabits many of the islands of the Malay Archipelago. This palm grows to a height of forty feet or more and has a large, comparatively smooth trunk, from the interior of which the starch is derived. In the preparation of the sago a full-grown tree is selected just before the expansion of the inflorescence, the trunk is felled and cut into sections three or four feet in length, which are thrown into water and soaked for several days. Afterward, the outer fibrous portion is removed and the interior is reduced to a coarse sawdust by means of a crude grating apparatus. This sawdust-like powder is then put into a large vessel, where the starch is crushed out with the aid of water and the feet of a native. It is then drawn off, suspended in the water, and is finally dried and shipped away for refinement.

Palm sugar is derived chiefly from the sugar palm (*Arenga saccharifera*) and the cocoanut palm (*Cocos nucifera*). The sugar is obtained from the *Arenga* by binding the numerous branches of the pendulous inflorescence into a compact cylinder, without removing them from the tree, and then chopping off the ends and making several incisions along the sides of the branches. The sweet sap is caught in a vessel made from a bamboo-stem; it continues to flow for several days, is collected every twenty-four hours and is boiled down over a crude oven.

The paper was brought to a close with remarks on masticatories such as the betel-nut —the fruit of the Areca palm (*Areca Catechu*) —and on some of the edible fruits, such as the durian and mangosteen.

Mr. G. V. Nash showed flowering species of Melastomaceæ from the conservatories of the New York Botanical Garden, including one of *Heterocentron elegans* from Mexico and one of *Medinilla magnifica* from the Philippines.

Dr. N. L. Britton exhibited specimens of two apparently undescribed species of poplar from Wyoming, one allied to *Populus tremuloides,* the other to *P. augustifolia.*

Marshall A. Howe,
Secretary pro tem.

The Geological Society of Washington.

The 155th meeting was held on April 13 and Mr. J. S. Diller read a paper on 'The Composition and Structure of the Klamath Mountains.'

The lithologic, stratigraphic and faunal relations of the various sedimentary formations are considered in their order of development, beginning with the mica-schist, which is possibly of pre-Cambrian age. The Cambrian rocks of southeastern California and the Silurian rocks of the northern part of the Sierra Nevada have not yet been recognized in the Klamath Mountains, the oldest fossiliferous beds of that region being of Middle Devonian age. The stratigraphic succession of the Paleozoic and Mesozoic formations was discussed, and especial attention was devoted to the great unconformity which has been recognized at the base of the Cretaceous. The distribution of the marine and fresh-water Eocene in Oregon and the Miocene in California was indicated, as well as their relation to the development of the Trinity Basin.

In the next paper Mr. G. B. Richardson discussed 'The Stratigraphic Sequence in Trans-Pecos Texas North of the Texas and Pacific Railway.'

The rocks in this area range from pre-Cambrian to recent in age, most of the systems being represented. There are two areas of pre-Cambrian sediments: One is south of the Diablo Mountains between Eagle Flat and Vanhorn, where a group of folded and faulted formations consisting of silicious limestone, conglomerate, fine-textured red sandstone and schists is exposed. The other pre-Cambrian area is on the eastern flank of the Franklin Mountains, where there are about 3,000 feet of quartzite, slate and rhyolite.

The Cambrian is represented by 300 feet of sandstone of Acadian or Saratogan age exposed on the southeastern flank of the Franklin Mountains. Two other areas of sandstone of possible Cambrian age, but in which no fossils were found, are in the southern Hueco Mountains and northwest of Vanhorn.

The Ordovician is represented by about 1,200 feet of limestone in the Franklin Mountains. Three well-defined horizons are present, the Calciferous, the Galena Trenton and the Richmond. The Calciferous is also present in the southern Hueco Mountains and northwest of Vanhorn. A few isolated areas of limestone of the Niagara division of the Silurian occur in the Franklin Mountains.

The Devonian system and the Mississippian series of the Carboniferous are absent. The Pennsylvanian is represented by two limestone formations. The older occurs on the northwestern flank of the Franklin Mountains and the younger covers a large area in the Hueco, Diablo, Finlay and Cornudas mountains. These formations are each several thousand feet thick. In the Diablo Mountain region there is evidence that the pre-Pennsylvanian land was reduced to a peneplain.

Over 4,000 feet of rocks of Permian age containing a unique fauna which is being studied by Dr. G. H. Girty are present in the Delaware and Guadalupe Mountains. At the base of the section are 200 feet of black limestone. Above are over 2,000 feet of sandstone and interbedded limestone which are capped by 1,800 feet of massive white magnesian limestone. The relation of the Permian to the Pennsylvanian is concealed by the intervening Salt Basin.

A broad belt of gypsum, at least 300 feet thick, overlies these rocks and the gypsum is overlain by about 200 feet of sandstone and limestone which outcrop in a low range of hills west of the Pecos River. The age of these rocks is not known. They are either Permian or early Mesozoic.

The Jurassic is represented by a small limestone outlier of the Malone Mountains. The relations of these rocks to adjacent formations, however, is unknown, being concealed by unconsolidated basin deposits.

The Cretaceous is represented by the Fredericksburg and Washita divisions of the Comanche, which cover a considerable area. The Fredericksburg has been divided into three formations consisting of sandstone and limestone aggregating about 1,500 feet in thickness which are well exposed in the Finlay Mountains, about Sierra Blanca and in the southern Diablo Plateau. The Washita has not been subdivided. It consists of about 200 feet of buff-colored limestone and calcareous sandstone and shale well exposed near San Martine and Kent, and is present also in small outlying areas in the Sierra Blanca, Black and the Cornudas Mountains and in the vicinity of El Paso. There is evidence of the northward progress of the Comanche Sea in this area, shown by Washita rocks lying on the Carboniferous in the northern part of the area, while farther south rocks of Fredericksburg age immediately overlie the Carboniferous.

The Hueco, Salt and Toyah Basins—desert wash-covered areas characteristic of the Trans-Pecos country—are capped by unconsolidated detritus of Pleistocene age. Deep wells show that this material extends to considerable depths, and though no fossils have been found, possibly the lower deposits are of Tertiary age.

Mr. A. C. Veatch then discussed 'Some Peculiar Artesian Conditions on Long Island, N. Y.'

On Long Island, while the principles which govern artesian flows are necessarily those which produce the same phenomena elsewhere, there are certain essential modifications in the nature of the factors which produce these results. They may be briefly summarized as follows:

1. The deep zone of flow and the surface zone are essentially continuous. The whole island is composed of sands, with discontinuous clay masses, and the rain water is free to penetrate to any part of these beds without regard to dip.

2. The head depends not on dip of the strata, but on the curved nature of the ground water table, which gives to the water under a clay bed a pressure equal to the height of the

ground water above the edge of that clay mass, less the loss in transmission.

3. The dip of the strata is, therefore, immaterial, and flows, in many cases, are produced against or up the dip.

4. The slope of this ground water table is so precipitous at the heads of many of the deep reentrant bays on the north shore that a slight difference in porosity is sufficient to determine an artesian horizon, and wells in such situations and which penetrate nothing but sand and gravel are frequently artesian.

ALFRED H. BROOKS,
Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE five hundred and eighty-fifth meeting was held April 22 and 23 jointly with the American Physical Society. Reports of the papers read during the day sessions will appear in the proceedings of that society.

On Friday evening Mr. Alexander Graham Bell delivered a lecture on 'Tetrahedral Kites,' exhibiting numerous small kites and the cells out of which large structures are built up, and many lantern views of the large kites he has flown at his experiment station in Nova Scotia. The noteworthy features developed by the experiments were the great strength combined with lightness of the kites for a given lifting power; their ability to rise more nearly vertically above the point of attachment at the ground than other forms of kites; and their remarkable steadiness, especially when the broadside is toward the wind. The speaker intends to carry on his experiments during the coming summer.

CHARLES K. WEAD,
Secretary.

THE ASSOCIATION OF OHIO TEACHERS OF MATHEMATICS AND SCIENCE.

THE association was organized at a meeting held in Columbus, April 2, 1904. At this meeting the following papers were read and discussed:

PRES. CHARLES S. HOWE, The Case School of Applied Science, Cleveland: 'The Effect of Entrance Examinations upon the Mathematical Work of the Preparatory School and the College.'

DR. GEORGE BRUCE HALSTED, Kenyon College, Gambier: 'The Value of Non-Euclidean Geometry to the Teacher.'

PROFESSOR FRANKLIN I. JONES, University School, Cleveland: 'The Laboratory Method in High School Mathematics.'

In his paper Dr. Halsted pointed out that the results of the recent studies on the foundations of geometry now permit a simple and rigorous treatment of elementary geometry without the introduction of either continuity or limits. The constructions of elementary geometry are possible without the compasses by means of the rules alone.

THE NORTHEASTERN SECTION OF THE AMERICAN CHEMICAL SOCIETY.

THE fifty-second meeting of the section was held Friday evening, April 22, at Huntington Hall, Massachusetts Institute of Technology, Boston, with President W. H. Walker in the chair. About 650 members and friends were present. Professor W. P. Bradley, of Wesleyan University, gave an address on 'Efficiency Tests of the Wesleyan Liquid Air Plant and Demonstration of Liquid Air,' in which he described, and illustrated with lantern slides, the plant at Wesleyan University for the manufacture of liquid air, while the latter part of the lecture was devoted to a description of the properties of liquid air, which were demonstrated by numerous experiments.

ARTHUR M. COMEY,
Secretary.

DISCUSSION AND CORRESPONDENCE.

ELLIPTICAL HUMAN ERYTHROCYTES.

I WAS much interested in a note by Professor Melvin Dresbach, of the Ohio State University, published in SCIENCE, March 18, 1904, giving an account of examinations of human blood, in which about ninety per cent. of the red corpuscles were oval. What rendered this observation remarkable—and indeed unique—was the statement that:

> The student in whose blood these corpuscles were found was a healthy mulatto about twenty-two years of age. His brother, who attended the university a few years ago, had normal red blood cells. Other than this no family history is at hand.

I wrote to Professor Dresbach a few days after reading this account, and he most kindly sent me a slide, dated January 10, 1903, for examination. Professor Dresbach wrote:

> The young man who furnished these peculiar cells was taken ill and left the city, and consequently I never saw him again. I have since learned that he died * * *.

It is unfortunate that there is no account of the disease that proved fatal in this case; and it is to be hoped that this defect in the history may be supplied later. It is well known that erythrocytes are often deformed—and sometimes many of them are oval—in certain blood diseases. To cite authorities that can be readily consulted, Osler writes, in treating of 'Progressive Pernicious Anemia':

> Microscopically the red blood-corpuscles present a great variation in size, and there can be seen large giant forms, megalocytes, which are often ovoid in form, measuring eight, eleven or even fifteen micromillimeters in diameter—a circumstance which Henry regards as indicating a reversion to a lower type. Laache thinks these pathognomonic, and they certainly form a constant feature. ('The Principles and Practice of Medicine,' New York, 1895, p. 729.)

These changes in the form of the corpuscles have been described under the name of poikilocytosis, and are referred to by Flint ('Principles and Practice of Medicine,' Philadelphia, 1886, pp. 60 and 386), in connection with pernicious anemia. Ewing ('Pathology of the Blood,' Philadelphia, 1903, p. 256) writes:

> Sometimes in non-infectious purpura hemorrhagica the red corpuscles are undersized and many are oval.

In view of these facts, it seems impossible to accept the proposition that the subject of the observation noted 'was a healthy mulatto.' He certainly was affected with poikilocytosis. As the oval corpuscles in this case measured 10.3 by 4.1 microns—certainly not enlarged, the normal corpuscles being seven to eight microns in diameter—it is possible that the poikilocytosis was a condition antecedent to a severe purpura hemorrhagica, which was the immediate cause of death. In pernicious anemia, the number of corpuscles is diminished and may become as low as 500,000 per cubic millimeter, instead of 5,000,000, which is the normal average, and megalocytes are nearly always found. Still, as there are no observations—with which I am acquainted, at least—in regard to the blood in pernicious anemia, before grave and distinctive symptoms have appeared, death may have been due to this disease.

AUSTIN FLINT.

CORNELL UNIVERSITY MEDICAL COLLEGE,
NEW YORK, April 25, 1904.

CONVOCATION WEEK.

THE Editor of SCIENCE writes: "Among the points on which an expression of opinion would be useful are: (1) Should the American Association maintain its sections for special papers or should these be left to the special societies? (2) Should the association attempt to popularize science, and if so how? (3) Should the association include in its scope education, economics, philology, etc.? (4) Should the association meet in summer or winter or both? (5) Should the association meet in regional sections, with only occasional joint meetings? (6) What should the association do to promote cooperation among men of science and the advancement and diffusion of science?"

After reading the great number of diverse opinions that have appeared in SCIENCE concerning the condition of the American Association and the nature of its work, every subscriber must begin to think something is wrong somewhere, though he may be utterly at a loss to know what remedies to prescribe.

The writer can not help thinking that most that has lately been written on the subject has added to the apparent unrest, on the whole very likely doing more harm than good. Each writer has committed himself to a certain policy, which he thinks should be adopted. With all this talk, it is not difficult to show that large additions of members have been made during the period of special or affiliated societies. Several of these societies have been the means of increasing the membership of the American Association instead of decreasing it.

1. Let the association keep up all its sections, possibly adding to the number, freely cooperating with special societies, each section showing a willingness to unite in preparing a program with any one or more special societies having a like object.

2. Years ago at meetings of the association, the late W. A. Rogers in Boston and E. S. Morse in Detroit, strenuously advocated the presentation of no papers that did not present the results of original work. Professor Cope often took the same ground, not infrequently helping to reject papers because of their popular nature.

I have recently thought it desirable to have a number of speakers selected by officers of the sections, perhaps with the approval of the council, to present some topic or series of topics in a popular way to attract 'outsiders.' It would hardly be safe to permit any volunteers to present papers on a popular topic.

3. Education, economics, but not philology.

4. Once a year, preferably in winter, till this date has had a fair trial.

5. Meet most of the time in populous regions from Washington to Boston, Detroit, Chicago, where many people are most sure to attend.

6. The association through Science is now performing a great work. W. J. Beal.

ERRORS IN NOMENCLATURE.

To the Editor of Science: In the *American Naturalist* for February is a paper by Miss E. G. Mitchell purporting to date from Cornell University and expressing acknowledgments to Instructor H. D. Reed and myself. Besides some typographic errors it contains so many incorrect generic and specific names that, in justice to the university and ourselves, Dr. Reed and I feel obliged to disclaim responsibility for them. Two years ago some dissections and observations were made by Miss Mitchell in this laboratory, and she was probably encouraged to complete and publish them. But at that time our concern was with the subject-matter, and we did not undertake to verify the names of the fishes examined. Neither the manuscript nor a proof has been submitted to us recently, as would have been required before assenting to publication as if from the department. Others, like ourselves, probably query why the paper was not passed upon by the ichthyological editor of the *Naturalist*. A list of corrections has been sent to Miss Mitchell, in Louisiana, with the expectation that she will request their immediate publication. Burt G. Wilder.

Ithaca, N. Y.
May 2, 1904.

SPECIAL ARTICLES.

A REFERENCE TO THE ORIGIN OF SPECIES IN AN EARLY LETTER (1796) SIGNED BY BOTH LAMARCK AND GEOFFROY.

Among the papers of the elder Peale which were recently dispersed in Philadelphia was a four-page letter in folio, on official paper, signed by Lamarck as director of the Museum of Natural History and by Geoffroy as 'professor and secretary.' The writing is in the hand of Geoffroy, and it is, accordingly, fair to assume the composition and the doing into English were also his. The ideas, however, are subscribed to by Lamarck 'for director' in his characteristic hand.

One might add that manuscripts connected with Lamarck are rare; in fact, few are known which touch upon variation in species, and the present letter may, therefore, be quoted literatim, for what it contains of an extra philosophical nature will be at least of human interest as indicating the type of correspondence which such a man as Peale would have read to his colleagues of the Academy of Natural Sciences.

at Paris, 30 Juny 1796

LIBERTÉ, ÉGALITÉ, FRATERNITE.
MUSÉUM NATIONAL
D'HISTOIRE NATURELLE.

The Professors directors of the National Museum of Natural History To Mr. Peales, at Philadelphia.

Sir,

Mr. Beauvois has transmitted us the letter wich you directed to him, by wich you propose yoursel to enter into a correspondance with the Museum of Natural History of the french Nation. We are pleased to seize an opportunity wich can afford us some communication with a Naturalist of your merit. Every thing you announce is

agreable and will be equally useful on both sides. We shall send you with pleasure and care a collection of the European productions in exchange for the Americans, which your love for the science of Nature impels you to collect, be so kind as to correspond with us on this subject. The way by wich your letters and your sendings can reach us is simple. Direct your instructions to the Minister of the Marine of the french republique; marking on the direction that they are destined for the Museum of Natural History.

Give us leave, Sir, to call your attention on the subjects wich we desire to receive first. Those enormous bones wich are found in great quantity on the borders of the Ohio the exact knowledge of those objects is more important towards the theory of the earth, than is generally thought of. We ardently wish some couples of alive animals *à bourses* (Marsupialia, opossums). Their generation is too hypothetical. The french Naturalists wish to acquire at last a solid opinion on this important question, wich can throw a light on the generation in general. The scalpel may perhaps lead us to discover particular organs, wich have not yet been described, wich might afford us some new views.

We also desire some species of quadrupeds of your climate. they have some conformity with those of the ancient continent. they are even been confounded with one another. Neverthelss we think they differ as to their species; and to be assured of it positively we should be pleased to receive indistinctly* all those you could have gathered. We are about to proove that no species of the ancient continent exists in the new et vice versâ and that great proof founded in the contrary opinion by wich both continents were formerly united towards the north would fall as groundless.

Therefore it would be highly important to us to know the Bears of the Illinois the stags and Roe-bucks of Canada the stairs,† the mountain Rats (Marmottes) the weasels (Belettes) the Bats (Chauvre souris) the moles (taupes) the martes (les martes) the beavers (les Castors ou bievres) etc We should be grateful if you would join to these the animals of our own country wich have transmitted in our ships to your country, as the rats, the mouses the *sorex araneus* (mus araigne). It is incredible what variety these animals offer to the attentive eye. How many analogous forms are taken for Species. It would be interesting to know what degeneration their transplantation has produced on their economy. They would lead us to a more exact knowledge on the nature of the Species and even of the Species in general. Spiritous liquors are the best means of preserving of all those animals. by this mean we will acquire with respect to foreign animals all the most striking facts wich they offer to the observator. We know better their external form, their skeletton, their organes of nutrition, of respiration, of circulation, of generation; and to finish animals always arive in a good condition. It is the manner in wich we shall transmit to you all our animals, wether quadrupeds, or birds or insects if these animals are of a smale size unless you prefer the ordinary means.

As to great animals whose preservation in spirituous liquor would be too dispendious,* we would be satisfied with the skins but for gods sake leave to the skin the scull and bones of the feet. We would be equally grateful if you would add to your envoys a skeleton separated from the great animals, whose form is different from that of those species well known in Europe, and to use the language of Naturalists a skeletton of each gender. We shall pay the same regard to you We shall not fail of sending you preparations as we wish them form you, convinced that it is to the progress of Natural History.

We already possess a sufficient quantity of smal birds from north America, however the list of those wanting in consulting the work of Catesby is considerable. you will find it with this letter. By this mean you will be informed that all the birds marked by Catesby wich are not inscribed on the list form a part of our precious collection and are less necessary than the others.

We wished, Sir, that our correspondance should not be confined to the exchanges of European productions with American only, be to kind as to make it litterary; send us the catalogue of all the works appearing on Natural History in the united States. Let us know the history of that science by your know corporations of learned men instituted to its progress. Depend on the reciprocation on our part. Inquire, Sir, after all the particulas; do not fear to swell your letter. I shall give it ful credit as much as it lays in my power. When the means shall be deficient, I shall write it to you with frankness.

Accept, Sir, the assurance of our estim and obedience.

LAMARCK
for director.

GEOFFROY
Professor and Secretary of the Administration of the Museum of Natural History.

* ? indiscriminately.

† ? Bison.

* ? Expensive.

The obvious interest of the foregoing letter is in its testimony that the writers were keenly alert as to transformism at this early date (1796), and that they had even marked out an important line of inquiry—comparison of old world species with new world species, and a study of the variation of those forms which had been introduced and allowed to run wild for a considerable period, possibly a hundred years. In other words, they are seeking 'a more exact knowledge on the nature of the species and even of the species in general.' And they clearly assume the importance of evolution, when they aim to measure the amount of change (degeneration) which transplantation has caused in the economy of mammals. Especially conspicuous is the importance which is apparently attributed to the Buffonian factor: 'we also desire some species of quadrupeds from your *climates*.' "It is incredible what variety these animals offer to the attentive eye." There is even a crude notion of parallelism in the remark that 'many analogous forms are taken for species.' Noteworthy also is their interest in the paleontological evidence, for the bones from salt licks are expected to yield important evidence as to 'the theory of the earth.' And we may conclude that Lamarck had evidently his Hydrogéologie (1802) as well as transformism in mind in his search for evidences as to distinctness of species widely separated geographically when he theorizes as to the ancient outlines of continents, and maintains that no species of the ancient continent exist in the new.

The present paper, moreover, narrows the probability that Lamarck borrowed his transformism from Doctor Darwin. For Lamarck is not known to have had evolutional tendencies before about 1799, and it has accordingly been stated that the Zoonomia (1794) was the slowly working cause of his conversion. By the present evidence, moreover, he was enterprisingly investigating the nature and variability of species, as early as the spring of 1796, *i. e.*, less than two years after the publication of Darwin's work, and possibly before it was circulated abroad. Indeed, even in England there is little reference to it before 1798, and Paley's attack upon Darwinism did not appear till 1802. Of certain interest is the literary partnership of Lamarck and Geoffroy in philosophical matters at this early date. Geoffroy was then but twenty-four years of age, and this is, as far as I am aware, the earliest record of his interest in the origin of species. It antedates by several years his studies on the mummied fauna of Egypt; and we may naturally query whether he may not already have had in mind to test the possibilities of variation by comparison of the early and late 'productions' of the valley of the Nile before Napoleon had laid his plans for an actual invasion?

Bashford Dean.
Columbia University.

THE NATURE OF THE PELÉE TOWER.

The recent publication of a note by Professor Lacroix (*Comptes Rendus,* March 20, 1904) on the production of quartziferous rocks in the course of the actual eruption of Mont Pelée, and the stated conclusion arrived at by the distinguished French geologist that rocks of this character (and by analogy, other igneous rocks of more clearly marked figure, such as microgranulite and even true granite) may be formed superficially and do not require in their construction deep-seated pressure—conditions which have long since been recognized, even if the processes of formation had not before been observed—afford, perhaps, a sufficient reason for me to state my belief that the giant obelisk of rock, which at the time of its greatest development, the close of May of last year, towered out of the crateral opening of the volcano to a height of nearly 1,000 feet (and, had there been no summit, breakages would probably have risen a full thousand feet higher), had *not* the structure that was assigned to it by Lacroix—namely, that it represented an exceedingly viscous acidic lava which solidified immediately on its extrusion and rose vertically under volcanic stress instead of flowing off in the manner of the normal lava-streams. This seemingly simple explanation of one of the most remarkable structural forms of the earth's surface has apparently been accepted by most geologists, and my own earlier studies led me to the same conclusion. A later critical examina-

tion, however, based upon considerations drawn from the form of the tower, the distinctly varying conditions of two opposed faces, the absence of fluidal overflow at any point, and the sharp line of demarkation that separated the base of the structure from the enveloping cone or dome (in which a true flow was plainly apparent, exemplifying the Georgios-Santorin dome of 1866 and the Vesuvian 'monticule' of 1895), and a review of the difficulties that stand in the way of the Lacroix explanation, forces upon me very strongly the impression that the tower was merely the ancient core of the volcano that had been loosened from its moorings and lifted bodily outward by the force of the volcano's activity. The whole appearance of the tower was much more suggestive of an ancient rock metamorphosed by heat (or steam) action than of a newly formed and rapidly solidified lava, and as early as August, 1902 (*McClure's Magazine*), when its extraordinary relations were still unknown, I referred to it (and others, likewise) as giving the aspect of 'burned-out cinder masses.' This view of the structure of the Pelée tower has, indeed, suggested itself as a possibility to other geologists, and I believe was held tentatively by some before I had myself seriously considered it; but at this time it does not seem to me that there can be much doubt as to its broad accuracy.

The lifting of giant rock-masses or mountain-cores through the crateral axis of a volcano is not entirely unknown, for it is now many years since Abich described, in his monumental work on Transcaucasia, the upheaved mass occupying a portion of the crateral wall of the Palandokän volcano; and a somewhat similar structure had been noted still earlier by Scrope in the Puy Chopine of the Auvergne. Neither of these structures was in any way comparable in magnitude with the Pelée tower, but their manner of uplift was not unlikely largely identical. The fact that most volcanoes 'plug' themselves after varying periods of activity, and that some of these reopen directly in the line of earlier eruptions, would in itself seem to suggest that from time to time extravasated plugs (neck-cores or towers) should appear at the surface, and I take it for granted that some, at least, of what have heretofore been considered as volcanic erosion-fragments are in reality merely structures of this kind. It can hardly be possible that upthrusts of this nature should not exist. Sir Richard Strachey has, indeed, called attention (in *Nature*) to numerous 'towers' or fingers occurring over the trap-flows of the Dekkan plateau, and he likens these (observed and sketched by him the better part of seventy years ago) to the Pelée excrescence. In how far the structures may or may not be identical only a new study of the Indian field can positively determine; but I believe that the Indian figures will be found to represent the extremely acute 'thumbs' and pinnacles which surmount the trap plateau of different parts of Greenland (Omenak Promontory, Disko Island), whose origin through erosion can not be questioned. Somewhat more doubtful may be the character of the (true) Devil's Thumb which marks the entrance to Melville Bay, and whose picture looms up in my mind very similar to that of Pelée's tower.

In this brief note it is impossible to enter into a discussion of the difficulties that oppose themselves to the generally accepted view of the structure of the Pelée tower; some of these will be more particularly referred to in a general paper which is about being sent to press. The view here expressed may lead to a better understanding of the relations of the ejected fragmental rock, the greater part of which, it seems to me, is from the old stock of the volcano, with the chemical and physical composition of which it so closely agrees.

ANGELO HEILPRIN.

PHILADELPHIA,
May 5, 1904.

CURRENT NOTES ON METEOROLOGY.

A NEW SUNSHINE RECORDER.

IN *Symons's Meteorological Magazine* for March, the new Dawson-Lander sunshine recorder is thus described. The instrument consists of a fixed drum, on which some silver chloride photographic printing paper is fastened, under a film of transparent celluloid. An outer cover is rotated by clock-work once

in twenty-four hours, and a narrow slit is thereby directed towards the sun. A hood, funnel-shaped, protects the slit from diffused light, and allows of an error of about half an hour in the clock before sunlight is cut off from the slit. The drum carrying the sensitive paper travels, without rotation, along the axis of the cylinder, so that the record of a number of days may be obtained, one below the other. The advantages of this instrument are as follows: The chloride of silver paper makes possible a standard of intensity of sunshine which can be reproduced; the same size of paper is used at all seasons, and the instrument is serviceable for the sunshine of polar as well as of temperate latitudes.

CLIMATE OF CHILE.

A PAPER on 'The Economic Geography of Chile,' by J. Russell Smith, in the *Bulletin of the American Geographical Society*, XXXVI., 1904, 1–21, lays emphasis on the striking climatic contrasts between the northern desert provinces and the southern cool and rainy districts within the latitudes of the prevailing westerly winds. Between the deserts of the north and the forests of the south lie the agricultural regions of central Chile. Were it not for the mineral wealth, the great seaports and settlements of northern Chile would never have been developed, for the climatic conditions are distinctly hostile to human occupation. In the south, where the abundant rainfall favors the growth of trees, future deforestation will open the land more and more for settlement, but 'the economic center of gravity, and the home of four fifths or more of Chilean population, is, and must continue to be, in the central or agricultural region.' These large facts of the climatic control of settlement and occupation in Chile can not fail to impress themselves upon even the most casual observer who has the opportunity, which in 1897 came to the compiler of these notes, of making a climatic cross-section along the west coast of South America by taking the voyage from the Straits of Magellan to Panama.

MOUNTAIN SICKNESS.

IN Mr. D. W. Freshfield's book, 'Round Kangchenjunga,' it appears that those persons who suffered from mountain sickness were most affected between 15,000 and 16,000 feet, and that there was no increase of symptoms up to 20,000 feet. One member of the party 'had a constitution on which the only effect of altitudes of 20,000 feet was to increase his appetite and consequently his weight.' Mr. Freshfield was able to walk from 13,000 to 16,000 feet without halting, and sees no obstacle, so far as the physiological effects of diminished pressure are concerned, to an ascent of loftier mountains than Kangchenjunga.

WRECKS AND CASUALTIES ON THE GREAT LAKES IN 1903.

ACCORDING to the 'Meteorological Chart of the Great Lakes, Summary for the Season of 1903,' by A. J. Henry and N. B. Conger (Weather Bureau No. 298, 1904), twenty-four vessels became total losses through stress of weather. The loss due to fog was $277,500. The number of lives lost through stormy weather was forty-nine. R. DEC. WARD.

PROGRESS OF THE CONCILIUM BIBLIOGRAPHICUM.

DR. HERBERT HAVILAND FIELD, director of the Concilium, sends us an advance copy of his report, the most encouraging by far which he has been able to issue.

The number of cards issued since the foundation of the Concilium is 12,942,000.

The principal features of the progress of the past year are set forth in this very interesting report.

Of especial interest to Americans is the establishment of a set of the complete reference catalogue in the public room of the American Museum of Natural History, where it will not only be accessible to students, but from which immediate orders can be filled. This arrangement has been brought about by conference between the director of the concilium and Director Bumpus of the museum.

CONCILIUM BIBLIOGRAPHICUM (ZÜRICH, SWITZERLAND). GENERAL STATEMENT FOR 1903.

The present year has been a memorable one in the annals of the concilium. For the first time since the foundation of the work, the director has been able to renew personal relations with the great body of American zoologists and librarians. In Washington, Baltimore, Philadelphia, Princeton, New York, Woods Hole and Boston, an endeavor was made to gather suggestions and impressions from all possible sources; technical methods and devices were studied, and the firm conviction was obtained that the concilium may count on the support of American men of science. Not a trace of adverse criticism came to our ears, nothing but unqualified approval. It was particularly gratifying to see the many unforeseen applications of our classificatory system in zoological institutes and in libraries, large and small. In short, in this land, where the readiness to accept all innovations that are really practical is proverbial, we met an unexpected warmth of approval. Through a communication made in the Library Congress, and through numerous visits, the opinions of the leading librarians and bibliographers were also gathered. Here again there was unanimity, or rather, to be exact, unanimity less one dissenting voice.

The most noteworthy testimonial encountered in America was the offer of the American Museum of Natural History to patronize the work. This institution purchases the most complete set of cards obtainable, including the card catalogue of new species, etc. In addition, a complete collection of the main bibliography will be deposited in its library for distribution to those desiring to receive references to any special topic. Whenever information is desired, the cards may be obtained from the museum at the same terms as from Zürich and the cards thus withdrawn will be replenished as soon as possible.

Another important step taken in 1903 has been the reunion of the card catalogue with the *Zoolog. Anzeiger*. The concilium is thus called upon to continue a bibliography which forms an unbroken sequence since the year 1700. This circumstance gives to the concilium a unique position among the bibliographical enterprises of the world and makes it doubly the duty of biologists to aid the institution in its work.

The circumstances attending the transfer of the editorship of the bibliography of the *Zoolog. Anzeiger* to our hands were unfortunate in the extreme. We had no means of knowing what had been done and what remained to be done. Old illegible manuscript had to be utilized and a new organization created in the absence of the director of the concilium. The product was most unsatisfactory, and yet the time spent on the work was such as to hamper our entire activity and occasion serious financial loss. Now, however, the principal difficulties are removed and the work promises scientific success even though the arrangement be of little financial benefit to the concilium.

The report for 1903 would be incomplete without a tribute to the memory of Professor J. Victor Carus, late editor of the *Zoolog. Anzeiger*. A zoologist of the old school familiar with the science in all its ramifications, he also brought to the work profound classical learning, a rare knowledge of languages, a fine sense of order and proportions and a passion for hard work, which seemed almost incredible. Prevented by ill health from following an active career, he devoted his life to bibliography. Even in the last years, this feeble octogenarian sat whole days at his desk and prepared in his fine cramped handwriting the 10,000 titles that were sent yearly to press. No one who has never tried it can know what that means. To have done this for a lifetime seems beyond the powers of human endurance. But in spite of all this routine, it is to the added credit of Professor Carus that his mind was ever open to new ideas. Just as in his scientific career he became an ardent convert to Darwinism and took foremost place in making the works of Darwin accessible to his countrymen, so in later years he seized with avidity the new ideas in bibliography which the founding of the concilium made prominent and began the transformation of his bibliography in accordance with them.

With equal vigor, the old master of bibli-

ography felt himself, however, called upon to denounce an enterprise which, breaking with all sound bibliographical traditions, sought to evolve around the diplomatic green table a plan for a vast and disordered compilation, which through the simple fact of financial superiority was to supplant the product of all the individual labor of which Professor Carus offered in his own life the noblest example. It is not too much to say that this contemptuous neglect cast a deep shadow over the last years of his life. He lived, however, long enough to see his contention justified by events and to be freed, as he expressed it, from a dreadful nightmare.

Financially the year closed with a deficit, which, in view of the complications of the year, was quite inevitable. Fortunately, the American Association for the Advancement of Science and the Elizabeth Thompson Science Fund again came to the rescue. It has been generally taken for granted that the petition of the American Society of Naturalists and the American Association ensured favorable action on our request for adequate aid from the Carnegie Institution; but in spite of endorsement by the zoological advisory committee, no grant has been awarded. We are, therefore, again forced to make a strenuous appeal to private generosity.

The public expressions of approval of our work have been even more numerous in the past year than in those that have preceded. Besides the resolutions of the societies above mentioned and the discussion at the Library Congress, we may mention the articles published by Mr. Van den Broeck in which he declares that the work of the concilium is the ideal which other enterprises must endeavor to attain. In the ensuing correspondence, a plan for enlarging the scope of the concilium towards geology was elaborated, and could be realized if the necessary funds were forthcoming.

At the congress of the International Association of Botanists held in Leiden in April, a day was given to the discussion of a project of forming a botanical section of the concilium, and resolutions were unanimously passed advocating such action and offering as a contribution to the section the same sum that the association had hitherto devoted to its own bibliography. This offer was accepted by the concilium, to take effect as soon as an equal sum from some other source should be obtainable. The committee of the association has generously left the entire question open for a year pending the endeavor to obtain adequate support for the concilium.

During the summer of 1903, an international congress of forestry took up the question of bibliography and appointed a committee to consider the question of founding a bibliography in connection with the concilium. This action, of which we had no knowledge in advance, shows how far our work is being appreciated. The international committee is to meet soon in Zürich.

Arrangements have been perfected for the organization of a new bibliography in connection with the *Archiv für Rassen- und Gesellschaftsbiologie*. This bibliography will be the beginning of the realization of the plans for an exhaustive treatment of anthropology.

A promising project of extending the activity of the concilium to certain applications of science has been quite unexpectedly brought to us. One of the workers in the concilium is devoting himself to it.

The close of the year has finally seen the opening of a series of negotiations of great importance for the future organization of scientific bibliography, and which all tend to bring existing bibliographies one by one into harmony with our work. Though unsought by us, this new tendency is certainly to the advantage of all parties concerned and in the interest of science.

Further evidence of the reputation which the concilium has won is to be found in the great increase in the number of publications sent to this office for notice. With scientific societies this practice has become quite general and publishers are rapidly following the example.

Besides the innovations to which allusion has been made in the preceding pages, three new publications will be undertaken in 1904.

One of these will be a list of the journals

which have been excerpted for the bibliography.

	1896–98	1899	1900	1901	1902	1903	Total.
(*A*) Subject Index.							
1. Paleontology	1,460	1,840	2,662	2,035	1,436	2,170	11,603
2. General biology	187	151	92	155	93	200	878
3. Microscopy, etc.	266	132	249	263	107	169	1,186
4. Zoology	18,845	14,271	13,326	16,845	11,059	11,.....	85,.....
5. Anatomy	1,940	936	1,875	2,007	1,224	1,5...	9,5...
6. Physiology	1,380	1,270	433	—	—	—	3,083
Total	24,078	18,600	18,637	21,305	13,919	15,2...	111,7...
(*B*) Authors' Index.	16,165	9,492	10,890	10,119	6,727	7,.....	60,.....
Total	40,243	28,092	29,527	31,424	20,646	23,.....	173,.....

Another is a card catalogue of all new names of generic or subgeneric rank which have been proposed in paleontology or in zoology since January 1, 1901. Each name will be given two entries, one under the appropriate taxonomic heading, the other in alphabetical arrangement. The price per card of the new catalogue will be double the usual tariff.

The third new publication is that relating to comparative physiology, in regard to which a special circular has been prepared.

Sooner than we expected, our quarters have become too small for storing our rapidly growing collection; but relief has been found for the overflow in a neighboring house.

The following table shows the total number of entries in a complete set of cards arranged by subjects and by authors. The years refer to the date of publication of the cards.

Distribution by Topics.—The distribution of primary cards in the chief divisions of the bibliography is shown in the following tables. Our statistics are, however, merely approximate, the earlier cards of the complete series being now quite out of print. The 'complete set' as understood by us can best be explained by an example. Subscribers to the complete set have thus far received 134 cards in the division 'Fauna of Sumatra.' This same division of the systematic set contains a single reference (Moesch: 'Nach und aus dem Pfefferlande'). This contribution appeared to us too general for us to cite it under any particular systematic group and it was classed under Sumatra in general; the remaining 133 references deal with individual groups of animals found in Sumatra, as, *e. g.*, Hispidæ or Lemoniidæ. In the 'systematic set,' they are entered under Hispidæ, Lemoniidæ, etc.

SCIENTIFIC NOTES AND NEWS.

MR. F. A. LUCAS, curator of the Division of Comparative Anatomy of the U. S. National Museum, has been appointed curator in chief of the Museum of the Brooklyn Institute of Arts and Sciences. Mr. Lucas succeeds Mr. Alfred G. Mayer, who, as we have already announced, has been appointed curator of the Marine Laboratory of the Carnegie Institution at Tortugas, Florida.

SIR DAVID GILL, director of the Observatory of the Cape of Good Hope, has been elected honorary member of the Finnish Academy of Sciences.

THE French Geographical Society, at its general meeting on April 22, conferred gold medals on Dr. Sven Hedin and Captain Lenfant.

THE Council of the British Institution of Civil Engineers has made the following awards for papers read and discussed before the institution during the past session: A Telford gold medal to Major Sir Robert Hanbury Brown; a George Stephenson gold medal to Mr. G. H. Stephens, C.M.G.; and a Watt gold medal to Mr. Alphonse Steiger; Telford premiums to Mr. E. W. De Rusett, Dr. Hugh Robert Mill, Mr. Alexander Millar, and Mr. T. E. Stanton; a Manby premium to Professor J. Campbell Brown; and a Crampton prize to Mr. L. H. Savile.

The Iron and Steel Institute of Great Britain held its twenty-fifth annual meeting at London on May 6 and 7. Mr. Andrew Carnegie presided. The Bessemer gold medal for 1903 was presented to Sir James Kitson, M.P., past president, in recognition of his conspicuous services in the advancement of the metallurgy of iron and steel. The Andrew Carnegie gold medal for 1903 was awarded to Mr. Alfred Champion of Coopers Hill for researches in the heat treatment of steel under conditions of steelworks practise. A special medal was also awarded to Dr. O. Boudonard, of Paris, in recognition of the merits of his research on the determination of the points of allotropic changes of iron. Four Carnegie research scholarships of the value of £100, tenable for one year, were awarded respectively to C. O. Bannister (London), to P. Breuil (Paris), to K. A. Gunnar Dillner in conjunction with A. F. Enström (Stockholm), and to J. C. Gardner (Middlesbrough). Further grants were also made to A. Campion and to P. Longmuir (Sheffield). The Bessemer gold medal for 1904 was presented to Mr. Roberts A. Hadfield, vice-president, in recognition of his great services to the metallurgy of iron and steel. The Andrew Carnegie gold medal for 1904 was awarded to M. Pierre Breuil, of Paris, and a special silver medal was awarded to Mr. Percy Longmuir, of Sheffield.

At the annual meeting of the Royal Institution on May 2, officers were elected as follows: *President,* the Duke of Northumberland; *treasurer,* Sir James Crichton-Browne; *secretary,* Sir William Crookes; *managers,* Dr. Henry E. Armstrong, Sir William Abney, Mr. Shelford Bidwell, Sir Alexander Binnie, Mr. J. H. Balfour Browne, K.C., the Hon. Sir Henry Burton Buckley, Sir Thomas A. De la Rue, Dr. J. A. Fleming, Sir Victor Horsley, Lord Kelvin, Dr. Ludwig Mond, Sir Owen Roberts, Sir Thomas Henry Sanderson, Sir Felix Semon and Mr. W. H. Spottiswoode.

Professor E. B. Wilson, of Columbia University, has sailed for Europe to continue his researches at the Naples Zoological Station.

Professor Ernst Haeckel, who recently celebrated his seventieth birthday in Italy, has returned to Jena and has resumed his lectures.

We learn from *The Observatory* that Dr. W. Doberck has returned to Hong Kong Observatory after a period of leave in Europe on account of his health. His assistant, Mr. Figg, is now coming to England for a year or two.

An Astronomical Society has been founded at Newcastle on Tyne with Mr. P. E. Espin as the first president.

Edward W. Berry has been elected recording secretary of the Torrey Botanical Club in the place of Professor F. S. Earle, who has resigned to accept a scientific position in Cuba.

Miss Eugenia Metzger, M.D., assistant in physiology at the University of Missouri, has been appointed to the woman's table at the Zoological Station at Naples for the months of June, July and August.

The first field party of the U. S. Geological Survey to leave Washington this year is, as usual, the Alaskan contingent. During the past winter, congress increased its appropriation for Alaskan work from $60,000 to $80,000. Nine parties will be engaged there during the coming season in topographic and geologic work. Besides these, three subparties, which may be counted as offshoots of the larger ones, will take up special work, so that the number of survey investigations in Alaska during the summer will be twelve as compared with seven of last year. Among those taking part in the work are Mr. A. H. Brooks, Mr. C. W. Wright, Mr. F. W. Wright, Mr. F. H. Moffit, Dr. T. W. Stanton, Mr. A. G. Collier, Mr. L. M. Prindle and Mr. C. W. Purrington.

Professor G. H. Parker, of Harvard University, has given at the Brooklyn Institute of Arts and Sciences a course of six lectures on 'Human Sense Organs and their Evolution.'

The Horticultural Society of New York held its sixth annual meeting at the New York Botanical Garden on May 11. At the conclusion of the business meeting an illustrated lecture on 'Common Trees and their Uncommon Flowers' was given by Mr. J.

Horace McFarland. There was an exhibition of plants and flowers.

THE Brooklyn Institute of Arts and Sciences held, on May 10, a memorial meeting in honor of Herbert Spencer, the principal address being made by President J. G. Schurman, of Cornell University.

A COMMITTEE has been formed to prepare a memorial of the late Leslie Stephen, which in the first instance will consist of an engraving of a portrait by Mr. Watts, which will be presented to institutions with which Sir Leslie Stephen was closely associated.

PROFESSOR A. W. WILLIAMSON, F.R.S., the eminent British chemist, died on May 6, at the age of eighty years.

WE regret also to record the death of Sir Henry M. Stanley, the African explorer, of M. Leidie, professor of chemistry at Paris, and of Dr. W. Thiermann, lecturer on applied electricity at the Technical School at Hamburg.

THE annual conversazione of the Royal Society was held on May 13.

THERE will be a civil service examination on June 16 to fill the position of laboratory aid in physiology and pathology in the Department of Agriculture at a salary of $720.

THE government of Iceland has appropriated about $10,000 a year for twenty years to establish wireless telegraphic connection with Great Britain and between the towns of Iceland.

UNDER date of March 8, 1904, U. S. Consul H. L. Washington, of Geneva, reports that during the month of February the advance in piercing of the Simplon Tunnel was only 15 feet 7 inches per each working-day, and this work was entirely on the southern side. The tunneling work in the gallery on the northern side had not been resumed. In each of the two galleries a system of safety doors was being placed to lessen the effect of floods that may be caused by the springs. These doors would be completed about the middle of March and the mechanical boring would not be resumed until then in both galleries. At the end of February, 1904, a little more than 11.295 miles had been drilled, leaving 0.964 mile to be tunneled.

MR. ARCHIBALD ROGERS, a member of the board of trustees of the American Museum of Natural History, has presented to the museum an exceptionally perfect copy of the first edition of Audubon's 'Birds of the United States of America.' It is believed that not more than 175 copies of this edition of 'Audubon' are now in existence, of which about one half are thought to be in this country. Published in 87 parts at ten dollars each, the work is now valued at $3,000.

MR. MAX J. BAEHR, consul at Cienfuegos, writes to the Department of State in reference to the use of the metric system in Cuba, stating that it is established by law and is adopted in all transactions at the custom-house, city hall, and in the registry and records of property; in fact, it is compulsory and adhered to in all official acts. In groceries, all solid goods are sold by the ounce and pound, the United States pound being used, as the scales are mostly of American manufacture, a few only being imported from Germany. Liquors are usually sold at wholesale in original packages and at retail by the bottle or fraction of a bottle, the poor people sometimes buying a few cents' worth. The country's products, such as cereals, are sold by the pound or fraction thereof, except that corn when sold in ears is sold by the fanega, which is 1,000 ears of corn. Vegetables are generally sold by the pound, the arroba, or 25 pounds. Cabbages and bananas are sold in numbers from one up to one hundred or more. Civil engineers and land surveyors employ the metric system throughout their measurements. Mechanics in general make use of English inches as their unit measure.

THE next meeting of the Museums Association will be held at Norwich, during July 14 to 17, under the presidency of Dr. Sydney Harmer, F.R.S., keeper of the Museum of Zoology at Cambridge University. The membership of the association has increased so greatly of recent years that a large attendance is expected. We are asked to state that American visitors will be particularly welcome. Further information may be obtained from the secretary, E. Howarth, Public Museum, Sheffield, England.

Under date of March 3, 1901, it was announced that 'in order to further the laboratory instruction of large classes of students, Professor W. T. Porter would undertake to provide reliable physiological apparatus constructed under his personal supervision.' During the past three years such apparatus has been made by the mechanics of the Harvard Laboratory of Physiology. The demand for this apparatus now warrants a more systematic provision for its manufacture. Professor Porter therefore announces the formation of The Harvard Apparatus Company, organized for the advancement of laboratory teaching in physiology and allied sciences. This company will manufacture physiological apparatus of simple design, sound workmanship, and low cost, suitable for laboratory teaching and for research.

UNIVERSITY AND EDUCATIONAL NEWS.

Governor Odell has signed the bill appropriating $250,000 for the erection of a building for the College of Agriculture at Cornell University.

The corporation of the Massachusetts Institute of Technology voted that the executive committee be required to ascertain whether any arrangement can be made with Harvard University for a combination of effort in technical education such as will substantially preserve the organization, control, traditions and name of the Massachusetts Institute of Technology.

Eugene N. Foss has given $50,000 to the University of Vermont for the $1,000,000 fund which the graduates of that college are trying to raise to mark the centenary of the institution.

The will of the late Solomon Loeb, of New York City, gives more than $100,000 to public purposes, including $10,000 for the Chemical Laboratory of the New York University, $10,000 for the Hebrew Technical Institute and $5,000 to the American Museum of Natural History.

The University of Turin has recently celebrated the five hundredth anniversary of its foundation.

Denison University has secured a ten-year lease on a small plot of ground adjacent to the campus containing a fine permanent spring for a biological farm. The lease has been donated by a friend, also a fund for equipment, both amounting to $500. A small work room and open-air breeding pools with running water have been built and enclosed with netting.

King Edward laid the cornerstone for the new buildings of the Royal College of Science, Dublin, on May 28.

Professor Charles S. Howe was inaugurated as president of Case School of Applied Science, at Cleveland, Ohio, on May 11. President Ira Remsen, of Johns Hopkins University, spoke in behalf of the universities; President H. S. Pritchett, of the Massachusetts Institute of Technology, on behalf of the technical schools; John R. Freeman, of the American Society of Mechanical Engineers, on behalf of the technical societies; and President Charles Franklin Thwing, of Western Reserve University, on behalf of the colleges of Ohio. President Howe's inaugural address followed.

Dr. Maxime Bôcher, now assistant professor, has been appointed professor of mathematics at Harvard University. Dr. Edward D. Peters has been appointed professor of metallurgy.

Dr. A. C. Kerr has been promoted to a professorship of anatomy at Cornell University, and has been made secretary of the Ithaca Division of the Medical College.

Dr. Oskar Zoth, professor of physiology at Innsbrück, has accepted a call to the University of Graz.

At Williams College, Dr. Frederick H. Howard has been promoted to an assistant professorship in the department of anatomy and physiology.

Mr. J. O. Griffiths, B.A., late scholar of Balliol College, Oxford, has been elected to an ordinary fellowship after examination in mathematics and physics.